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The Astoria Plant of the New York Consolidated Gas Company.

[Prepared for the JOURNAL, by MR. C. C. SIMPSON, JR.]

CHAPTER VI.—FINAL.

The fall of 1911 and the spring of 1912 were, as far as the water gas unit was concerned, a repetition of 1906, when the coal gas plant was being tuned up. Let us see what has still to be done before the manufacturing department steps in and starts turning steam and oil into 80-cent gas.

Fig. 85 (taken in May, 1911) shows the progress of reclaiming the west end of Berrian's Island and also shows the first courses of steel for the oil tanks being placed. Fig. 86 was taken in September of the same year, looking north towards the island from the mainland. The storage tanks have now been completed, and two 12-inch oil lines are being laid on the trestle, through which the oil will run by gravity to the pumps in the generator pumphouse. To return to the tanks: These are each 73 feet in diameter and 32 feet deep, providing a total oil storage capacity of 2,000,000 gallons. The tanks will set in concrete wells, protected by heavy earth embankments, so that, in the event of leakage in the tanks themselves, the contents need not be lost. A motor-driven pump, located on Berrian's Island, will pump oil from vessels to the oil tanks at the rate of 1,000 gallons per minute.

Fig. 87 shows the exterior of the generator house, and in the fore-

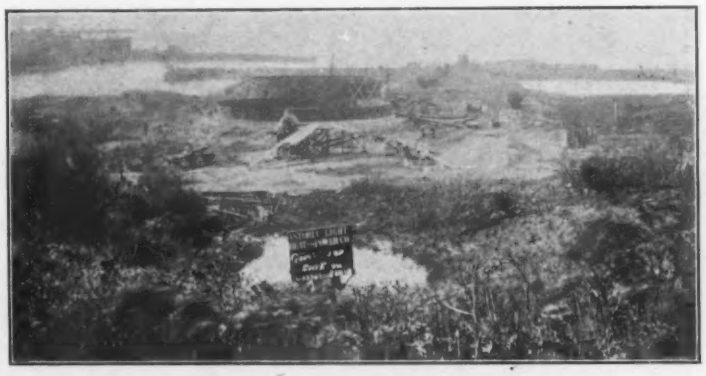

Fig. 85.

Fig. 86.

Fig. 87.

ground the pumphouse, which latter, while somewhat of a dwa ' compared with the other buildings of the unit, is to contain for present purposes no less than 14 separate pieces of pumping appara tus, and will still provide ample space for further installations. The pumps in this house are to handle salt water for the condensers, water for the hydraulic valve seals, tar circulation in the separators, tar fuel to the waste heat boilers, oil, and also pump a number of the drips in connection with the unit.

Proceeding now to the generator house, entering the same on the top or boiler floor, we see in Fig. 88 some of the marine type waste

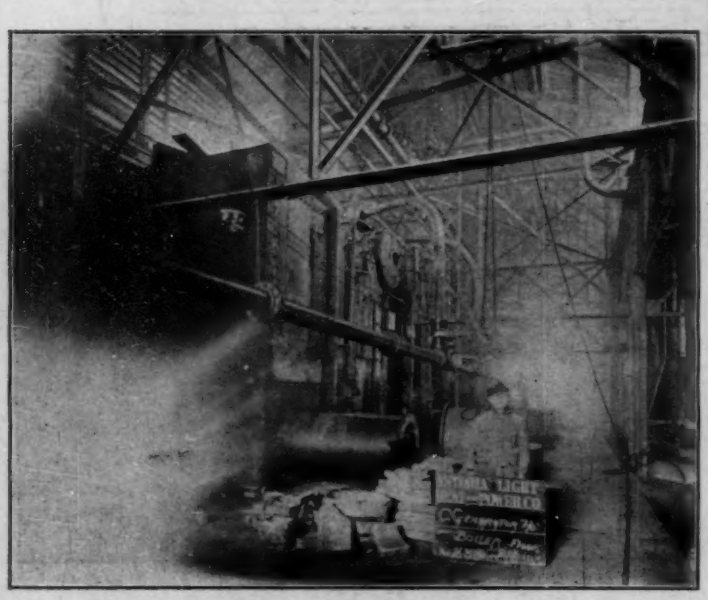

Fig. 88.

heat boilers, which are designed to utilize the heat of the gases during the "blow" and which furnish all steam to the building at 150 pounds pressure. These boilers are also equipped with tar burners, the tar being supplied under pressure by means of a pump situated in the water gas pump house. The boilers are all supported on heavy plate girders, carried directly by the interior columns, which help to account for the heavy column foundations mentioned previously in connection with this building. Then, working downwards, we see in Fig. 89 a portion of the charging floor, showing the

Fig. 89.

track system for running coal cars to the charging openings, and in the foreground one of the large water seal valves which control the passage of blast gas to the waste heat boilers; and then, one flight further down, we reach the operating floor, Fig. 90 showing several of the 12-foot Williamson generators about ready for gas making. These machines are well worth special mention. As before outlined,

Fig. 90.

the carburetor and superheater are combined in one shell, which is superimposed on the generator, this generator being 12 feet in diameter, the total height of the set being 46 feet. Large as they are, however, one man, taking very few steps, controls the whole operation of each set, and such parts of the apparatus as would not be directly visible from the gas maker's station have been made so by a system of mirrors. Blast air, at 40 inches water pressure, is furnished to each set by an individual steam, turbine-driven blower, at the rate of 14,000 cubic feet per minute. And, to descend one step further in this same building, Fig. 91 shows the generator house coal-

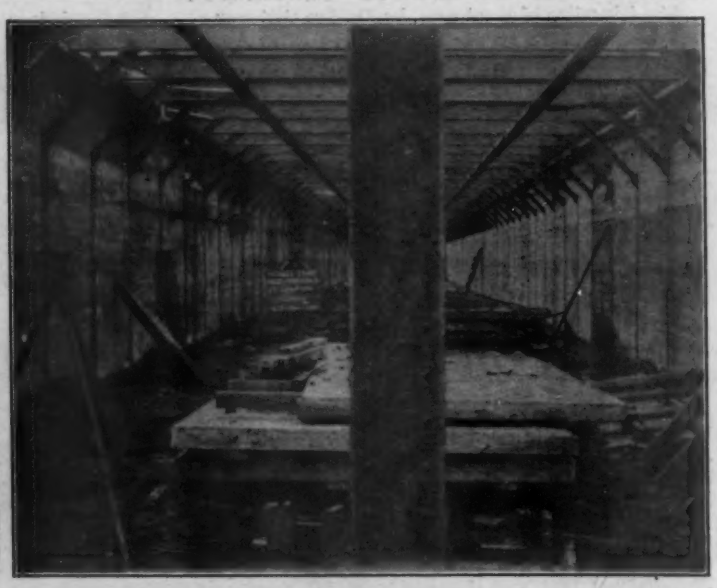

Fig. 91.

and-ash subway (the functions of which have been previously described) completed and about ready for track laying. No, you poor unfortunate straphanger; this particular subway will not help to ease your burdens. Light and ventilation are provided for by making such portion of the subway roof as is under the generator house, an open grating.

The tar extractor house is now well along toward completion, Fig. 92 showing the exterior of the building, and, going inside, we see, in Fig. 93, three of the six P. & A. tar extractors, about ready for service. These machines are smaller and simpler than those described for the coal gas unit, and the set of six will have a total daily capacity of 26,000,000 cubic feet. As before stated, a portion of this house is partitioned off for the storage space and handling apparatus for shavings used in the shavings scrubbers.

The 1,000,000 cubic feet relief holder (Fig. 94) has now been completed and is ready to be tested. A holder of this size is, of course, no novelty these days, but, qualified by the adjective "relief," it assumes quite a different aspect. A water gas plant having 2,000,000

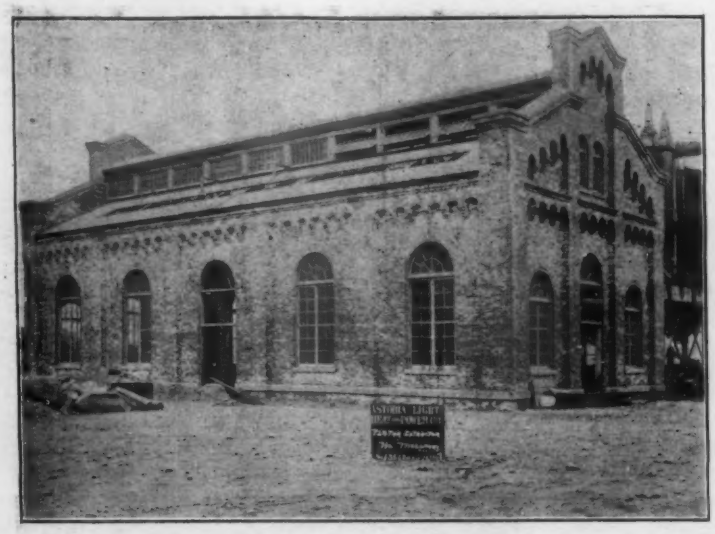

Fig. 92.

Fig. 93.

cubic feet relief holder capacity is no small undertaking, and when the east half of this unit is completed at some future date this will be the case.

In Fig. 95 are shown two of the eight purifiers for the west half of the unit, which apparatus will remain entirely in the open, as here seen, except that the sides of the boxes are to be lagged with an 8-inch layer of hollow brick to prevent loss of heat from the gas during purification. The coal gas purifiers were remarkable for their great size, but those for the water gas unit are even larger in point of capacity, being 34 feet square by 13 feet 3 inches in depth, and arranged with three 42-inch layers of oxide. The bottom of each box is composed of four conical dumps, through which spent oxide is dropped to the pavement below for revivification, or else, if its usefulness has passed, into dump carts, which can be driven beneath. As the boxes are entirely in the open, eliminating danger from explosion, all handling of box covers and of oxide is to be accomplished by an electric travelling crane. This crane, which has a span of 92 feet and a capacity of 13 tons, is operated from a man trolley similar to that previously described for the coal storage bridge and is provided with a 2-ton grab-bucket for the handling oxide to the boxes.

The boiler house has been completed in so far as the west half of the unit is concerned. Fig. 96—an interior view—showing four 410-horse power boilers ready for firing, and also the coal hoppers and chutes. This house is practically a duplicate of the coal gas unit boiler house, except that it will eventually contain 8 batteries as against 6 in the coal gas building. The fuel for the boilers is dumped into track hoppers outside from hopper bottom cars, and is raised by a bucket elevator to a conveyor, which in turn places it in the over-

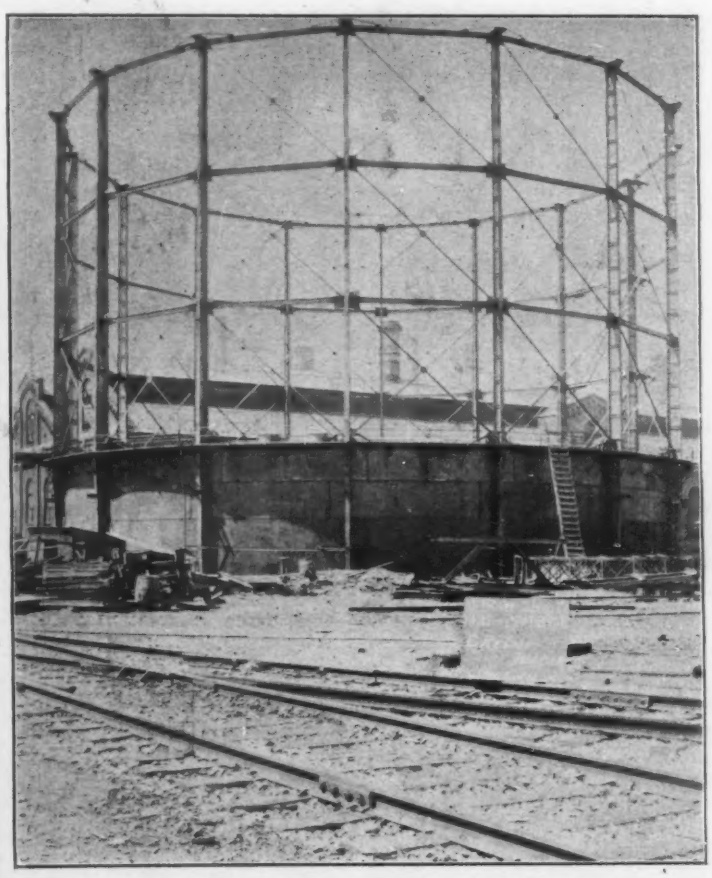

Fig. 94.

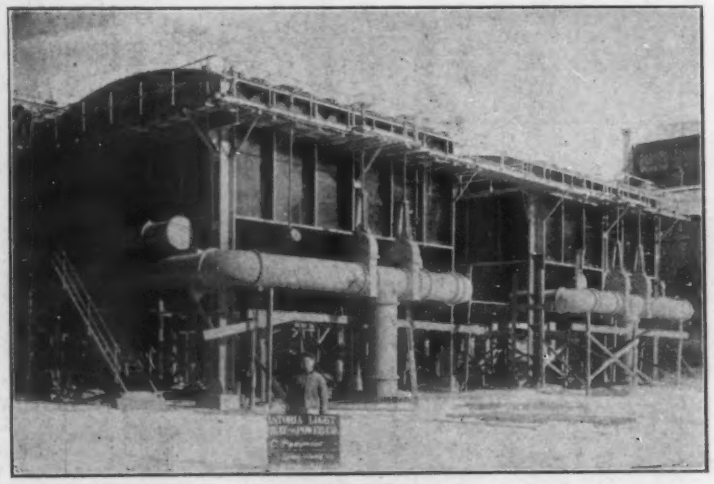

Fig. 95.

head bins or hoppers, shown in the photograph. Boiler feed water is supplied by two 4-stage, turbine-driven, centrifugal pumps. Fig. 97 is an exterior view of the water gas unit exhauster house, and this photograph also gives a very good idea of the general type of architecture used in all the buildings of the plant. As a general proposition, gas works buildings are at the best unsightly structures; but such is certainly not the case at Astoria. Fig. 98 (an interior view) shows 3 of the gas exhausters, connected up, ready for steam. These exhausters are driven by individual, direct-connected steam engines, and have each a nominal capacity of 13,000 cubic feet per minute. The house also contains a set of 3 air exhausters, belted to the gas machines, and which, as in the coal gas house, are so connected to the purifiers as to assist in prolonging the life of the oxide. Foundations have been built for 2 more gas exhausters, which are to be installed at such time as the east half of the unit is built.

Now we come to the point where we check up the quantity of gas made. Fig. 99 is an exterior view of the unit meter house, but of greater interest is Fig. 100, which shows two of the six 16 feet diameter, Hinman patent drums, about to be placed in the meter cases.

Fig. 96.

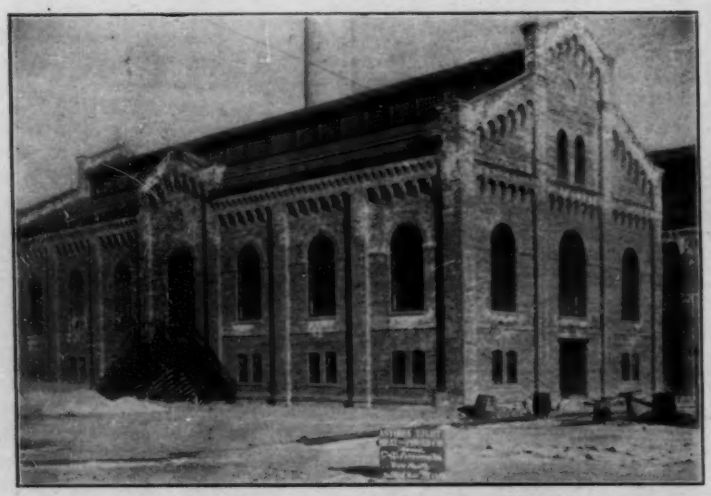

Fig. 97.

Fig. 98

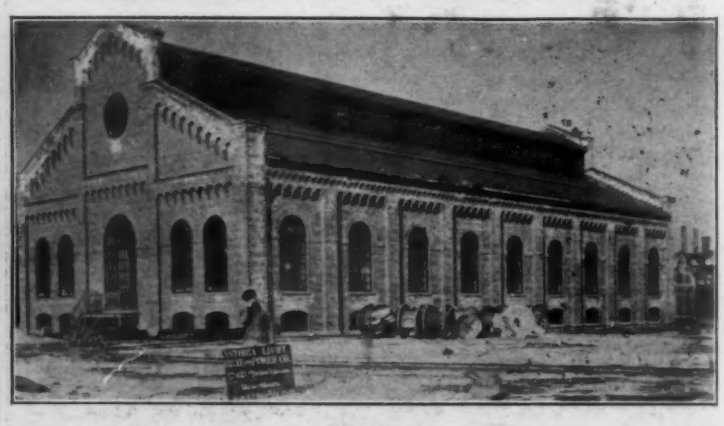

Fig. 99.

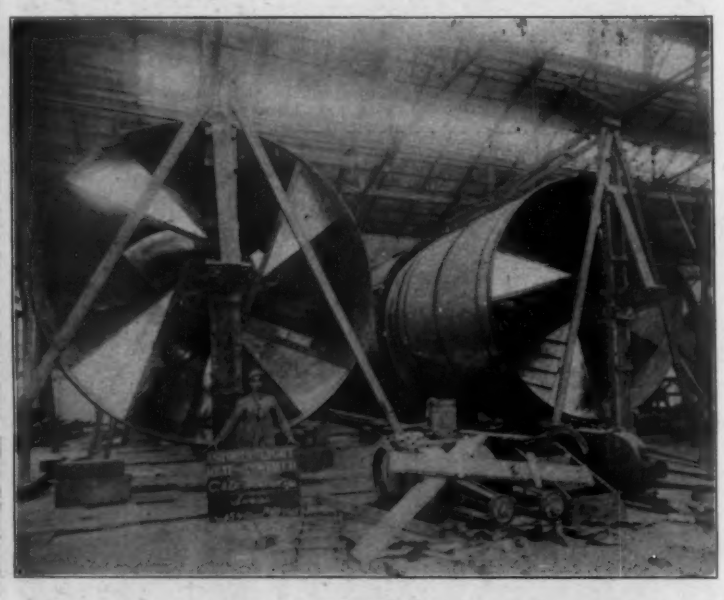

Fig. 100.

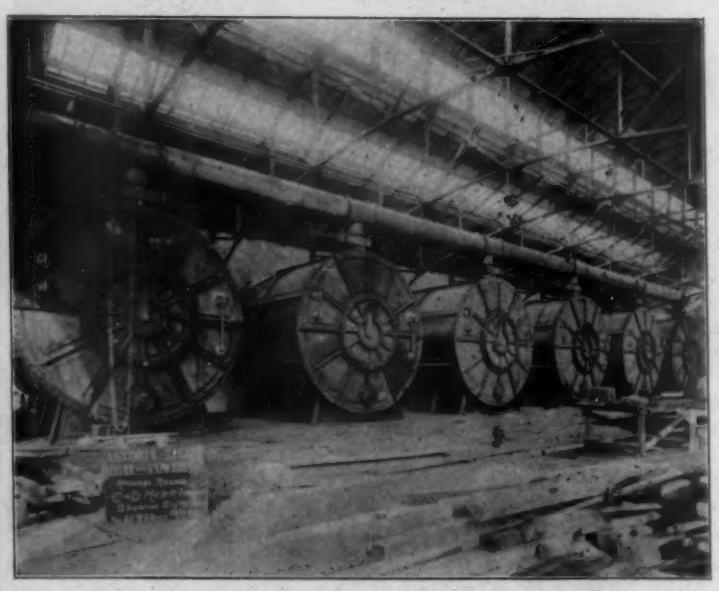

Fig. 101.

One does not often get a chance to see the inside of any gas meter let alone these, which are probably the largest in use to-day. Fig. 101 shows the completed installation of 6 meters, each having a capacity of 5,000,000 cubic feet in 24 hours. The installation of 6 more of these meters, when needed for the east-half of the unit, will give the water gas meter house a total daily capacity of 60,000,000 cubic feet.

Fig. 102 shows the plant photometer and calorimeter house—small in size, but immensely important in function—and to which the whole operating force looks for praise, or possibly (though not often, we hope) condemnation. This house is fully equipped with the most modern photometric and calorimetric devices, and hourly tests are made of the heating and lighting value of the gases from each point of manufacture.

There is a lot of heat around a gas plant of this size, and, however carefully watched, there is always the possibility of a fire breaking out. In view of the remote location of the works from any municipal service, it was thought wise to install a complete fire system. A net

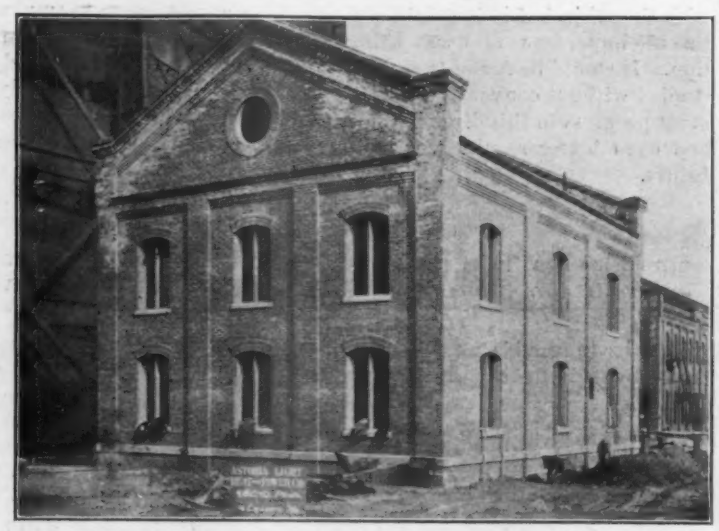

Fig. 102.

work of salt water mains and hydrants having been installed throughout the plant, hose reels were located at convenient points. In case of fire, word would immediately be sent to the north shore pump house, where two duplex piston pumps can send salt water through the main at 125 pounds pressure, at the rate of 2,000 gallons per minute.

Few people in this part of the country realize that the Borough of The Bronx has a population equal to that of the city of Pittsburgh, Pa., and that this territory is growing by leaps-and-bounds. In view of the fact that it is necessary to send a considerable quantity of gas there during the periods of heavy consumption, and realizing that sending gas to this territory by way of Ravenswood was a very roundabout method, it was considered advisable to provide a more direct route. Accordingly, work was started, in the fall of 1910, on a rock tunnel, 4,662 feet long, from Astoria to Port Morris. This tunnel, which at the present writing is practically completed, is nearly 20 feet in diameter, lined with concrete, and is some 250 feet below tide-water. In it will be laid two 72-inch, cast iron mains, and, when this is done, our old friend, the 60-inch (described in a previous chapter) will have lost its distinction of being the largest gas main in the world.

This is the story of the plant to date.

The only history under which the word "finis" can be written is that of a dead undertaking; and as the Astoria plant, though now an enormous proposition, is still in its infancy, this narrative can but be temporarily closed by writing, part in hope and part in prophecy:

"To be continued *ad infin.*"

The Measurement of Light and Illumination.

This was the title of the first of a series of five lectures on "Illuminating," recently delivered by Mr. J. S. Dow, at the Polytechnic, Regent street, London, England. They are intended to be supplementary to the earlier lectures of this course, which deals mainly with the illuminants, gas, oil, acetylene, electricity, etc.

In commencing this lecture Mr. Dow pointed out that a great change had recently come over photometry, which one time was regarded mainly as the plaything of the pure scientist and as an interesting field for study to be undertaken only in the laboratory, whereas now it is recognized that the measurement of light and illumination is of industrial importance, and that the light given by modern illuminants should be studied and stated with precision.

The lecturer then passed on to a brief explanation of measurements of candle power. He pointed out that what was measured was simply the "power of creating brightness" of a lamp. Of course, there are other qualities (occasionally very important, too), such as color, actinic effect, fog-penetrating power, etc., which deserve study; but they also require special forms of test. Photometry, therefore, was concerned mainly with visual effect, and all measurements of light must ultimately be referred back to the eye. It was, therefore, best, in making photometric tests, to work at an illumination (say ½-foot candles), such as is met with in everyday life. If a very feeble illumination is used the eye would be in an abnormal state and peculiar results might be obtained, especially if the lights compared differed widely in color. "Extinction" methods should be regarded with suspicion.

Strictly speaking, photometric tests were all comparative, hence we must have a standard to which such measurements can be referred, and that was formerly the light from one standard candle. But the "standard candle" has long been proved an untrustworthy standard, and has been practically replaced by the use of either: (A), large bulb, incandescent electric lamps; or (B), flame standards, such as the Harcourt 10 candle power pentane lamp. The chief difficulty in connection with flame standards is the influence exerted on their light by the condition of the atmosphere, such as the humidity and the barometric pressure: when it is recalled that a candle, at the summit of Mt. Blanc, is said to burn with a flame no more luminous than a spirit lamp, one can readily understand that the comparatively small barometric changes met with in the ordinary photometric laboratory may exert an appreciable influence. However, these effects had been fully studied and could be allowed for. One of the most interesting investigations of recent years was that by Trotter, Butterfield and Haldane, who carried out their experiments inside a diving bell, wherein the atmospheric conditions could be changed within very wide limits and with various factors adjusted independently, these exceptional conditions enabling the effect of atmospheric changes on the pentane lamp to be very exactly studied.

Incandescent glow lamps, of course, remained unaffected by atmospheric changes; but they had the drawback that the current of voltage taken by the lamp must be measured with great exactitude, and special laboratory apparatus was needed to do this. In addition, a glow lamp is not accurately reproducible in the way that a pentane lamp of exact specified dimensions should be, and its value as a standard might be somewhat easily imperilled by a slight mistake such as running the lamp at a pressure considerably above that for which it was intended. A series of standard glow lamps, however, together forms an excellent standard the average of the results obtained from say one dozen such lamps being frequently taken. Such lamps are constantly being calibrated and exchanged among the chief laboratories in England, France, Germany and the United States, and by this means the units of light are kept accurately constant. There is now only one single unit in use in England, France and the United States; namely, the "International candle," equal to one tenth of the light given by the pentane 10-candle power lamp. The German unit (Hefner candle) is equal to 0.9 international candles, so that the relation connecting the two existing units is fortunately a simple one.

The lecturer then proceeded to describe the ordinary operations of photometry as carried out on a bench in the laboratory, pointing out the distinction between the order of accuracy possible in a well-equipped laboratory and in the case of commercial measurements. Under favorable conditions an accuracy within 0.5 per cent., was said to be impossible; but for industrial purposes 2 per cent. was ample, and in measurements of illumination even this figure could not always be attained. Reference was made to various forms of photometric screens. The Lummer-Brodhun and the Bunsen disk were probably as sensitive as any for the comparison of lights of the same color; when the colors were very different the flicker photometer was often preferred, and Dr. Ives had recently advocated the use of this type of instrument on theoretical grounds as well. It might, however, be doubted whether the real physiological difficulties of heterochromatic and spectrum photometry could be avoided. One had to be content with some empirical method.

Mr. Dow then passed on to explain the chief photometric quantities: Intensity, illumination, flux of light, surface-brightness and intrinsic brilliancy (candle power per square inch). It was a mistake to judge the value of an illuminant by looking at the lamp itself and noting its brightness; such a judgment being usually based mainly on high intrinsic brilliancy, which one desires to avoid. The right plan was to observe the brightness of the illuminated surroundings. As an illustration of the convenience of the lumen, the unit of light-quantity, Mr. Dow took the image thrown by the lantern on the screen. The brightness was about 1-foot candle, a value which was a very usual one for cinematograph and lantern images. The area of the screen being about 50 square feet, the actual flux of light usefully concentrated on the screen was, therefore, about 50 lumens. Hence if all the light from the illuminant were to be usefully employed in forming the image on the screen, only about 50/4 = say 5-candle power would be needed. Yet, as a matter of fact, one used, in the

optical lantern, a source giving several hundred candle power. This was necessary because so little of the light produced was actually transmitted through the lantern objective and effectively utilized.

The next point touched on by the lecturer was the distribution of light from various illuminants. It was shown that the polar curves of light distribution from an upright and inverted mantle, carbon, and metallic filament lamps, mercury vapor lamps and arc lamps, were all quite different. Moreover one even found that two gas lamps, from different makers, rated at the same candle power, might give quite distinct polar curves owing to the shape of the reflectors as used being slightly different. It was unfortunately the usual practice that only the light in the direction of the maximum ray be stated. Obviously this made it very difficult to compare the light given by various illuminants. An extreme case in point would be a searchlight, where all the available light was concentrated into a single parallel beam. Clearly this could not be compared with ordinary lamps at all on this basis.

The time was now approaching when they would all be able to obtain practically any polar curve one pleased by the judicious use of reflectors, and it would, therefore, seem that the best all-round method of judging the output of light from lamps was to determine the average of the light in all directions; in other words to give, not the candle power in one direction only, but either the total flux of light in lumens or its equivalent, the mean spherical candle power. After explaining that by mean spherical candle power was meant "The light which a source would give out if it emitted the same total light as at present (but evenly) in all directions." The lecturer went on to describe briefly various methods of determining mean spherical candle power, including the Matthews' integrating mirror-photometer and the Ulbricht globe. He pointed out, however, that the Ulbricht globe had certain limitations. For example he understood it could not readily be applied to gas lamps, because the fact of confining them within a limited space, and thus hindering to some extent the access of air, would affect the light. Moreover he was disposed to doubt whether the theory of the globe would apply rigidly in the case of a unit concentrating all its light over a very narrow area—*e. g.*, an electric glow lamp in a very focussing form of reflector, a motor car headlight, etc.

The chief thing in giving the results of photometric tests of lamps was to state definitely the exact candle power that was intended, and the practice was now becoming usual to adopt the Continental symbols:

Io = Mean spherical candle power.
Io = Mean hemispherical candle power (lower).
Io = " " " " (upper).
Iα = Mean intensity at an angle α to the vertical.

Various forms of apparatus for obtaining polar curves were then illustrated and explained. The lecturer next turned to measurements of illumination, to which the last portion of the story was entirely devoted. He described briefly some well known instruments of this kind such as the Martens, Trotter and Harrison types, and exhibited three very small instruments devised in England known as the holophane lumeter, the luxometer and the lightometer. He remarked that since he had devised the first named of these instruments, in conjunction with Mr. Mackinney, about 2 years ago, quite a number of small instruments bearing somewhat fanciful names had been brought out and he understood there were others coming. This showed how highly measurements of illumination were appreciated. In England the tendency had been thoroughly practical. It was recognized that the chief requirements were moderate accuracy, simplicity and ease of manipulation, and portability. The kind of instruments referred to were *really* portable in the sense that they could be carried about with the ease of a small camera.

Naturally this entailed some concession as regards accuracy; but it would be found that, if one attempted to reproduce laboratory accuracy with an instrument of this type, it meant the gradual addition of complexities until one obtained a traveling photometer room rather than an illumination photometer.

With these instruments many useful data had been obtained in schools and libraries in London, and had been described at meetings of the Illuminating Engineering Society. Special reference might perhaps be made to the very valuable series of researches undertaken on behalf of the Home Office by Mr. D. R. Wilson, who had carried out over 2,500 measurements in over 100 factories. In conclusion, the lecturer mentioned that an important step had just been taken by the Home Secretary, who had appointed a special committee to deal with the subject of industrial lighting. This would serve to emphasize the importance that was being now attached to good illumination. It would be found that this subject could not be exhaustively studied without convenient methods of measurement. Fortunately, great progress in this direction had been made in the last few years, and even better results would doubtless be obtained in the near future.

(Concluded from page 102.)

Some Figures from the Annual Report (Dec. 31, 1912) to the Shareholders of the New York Consolidated Gas Company.

In order to provide needed space for the clerical and mechanical departments in the rapidly growing territory of the Northern Union Gas Company, extensions have been made to the office and shop buildings in Webster avenue. A garage has been built opposite the office, on a lot, running through from Webster to Park avenues, to accommodate 8 business automobiles and electric vehicles. There is now in process of erection, at 110th and 111th streets and First avenue, a building 200 feet by 107 feet, 10 stories in height, in which will be located shops for the repair of the stoves and meters of the Consolidated Company and its affiliated Companies. All of the testing by the Public Service Commission of meters belonging to these Companies will be done in this building. It is estimated that 210,000 meters and 25,000 stoves will be repaired here each year, requiring the employment of about 600 men. Facilities will also be provided for the economical storage of meters and gas appliances.

"In December, 1910, the Company commenced the erection of the first section of a 12-story office building on its property, southeast corner of Irving place and 15th street, extending 155.5 feet, easterly on 15th street and 84 feet, southerly, on Irving place. It was intended that accommodations should be provided in this building for all of the gas and electric companies in the Borough of Manhattan, in which the Consolidated Gas Company is interested, maintaining elsewhere only such local offices as were necessary for the transaction of business with the public. It soon became evident, however that the requirements of the several departments of this Company and of its affiliated Companies would exceed the provision for office space then planned and, in 1912, a plot of land, 142 feet by 84 feet, adjoining and easterly of the Company's property, was purchased, which, added to the original parcel, makes a plot 297.5 feet by 84 feet.

"The original plans for a 12-story building were necessarily remodeled and extended and a design made for a building to cover the entire area and to be 18 stories in height. This change in plan required the raising of our present building 6 additional stories, to correspond to, and be in harmony with, the proposed 18-story buildings on both sides. The architectural plan, which has been accepted, is based on the lines of the present 12-story building, and the new structure as a whole will combine durability, simplicity and dignity. Its front elevation will be of limestone. The building construction will be of the most modern fireproof type, fitted with all the modern conveniences required for the Company's use. On the roof there will be a pavilion, in which will be placed a model gas and electric kitchen and a dining room for the employees. On one of the floors there will be a rest room for the female employees, as well as a library and reading room for the employees generally and also an auditorium for lecture purposes and meetings. The elevator service will be of the most modern standard, equipped with the latest safety devices for preventing accidents, such as automatic doors (which prevent the cars from leaving the landings when the doors are not entirely closed) and the illumination of thresholds (so that passengers will not stumble) and with other devices similarly intended to minimize accidents. The lavatory and toilet facilities are also of the most modern type, each floor being provided with toilet rooms finished in sanitary tile and glass, also with a supply of drinking water, filtered, sterilized and cooled. The light and ventilation of the building have received particular attention. To effect these objects ample courts will be provided, extending along the rear of the building, and the artificial circulation of air will be produced by mechanically driven fans. The exterior of the building will be appropriately and effectively illuminated. The first year of the course in "Gas Salesmanship," conducted by one of the prominent Gas Associations, and in which many of the canvassers and solicitors of the Consolidated Gas Company and its affiliated Companies entered, has been completed. This educational course has greatly benefited the men who availed themselves of it, and made them more efficient in

the performance of their duties, especially of those which bring them in contact with the public. Changes and improvements in the course, contemplated for the ensuing year, indicate that it will be even more valuable in the future. The Company pays the necessary tuition fees of all employees who enroll in this course. The School of Instruction, in which employees in the meter department are specially trained for the work they have to perform, was attended by 933 students during the year. A course in Accounting, consisting of weekly lectures by a Professor of Accounting from the New York University, and the periodical examination of students, which was started during the year by the New York Edison Company, and attended by employees of both the gas and electric companies, will be completed in February, 1913. It will be followed by a series of lectures, designed to illustrate the application of accounting theories to the practical operations of the various departments of the gas and electric business.

"The monthly meetings of the Society of Gas Engineering of New York City have been continued throughout the year. The membership of this organization is limited to employees, holding responsible positions in the manufacturing, construction and distribution departments in the Consolidated Gas and its affiliated companies. These meetings furnish an opportunity for the heads of such departments and their assistants to exchange ideas and experiences in connection with their work. Technical papers and reports are read and discussed. The value of such intercourse is believed to have been enhanced during the past year by the delivery of lectures by a number of gentlemen, prominent in the scientific world, relating to some aspect of gas works operation, construction and distribution work.

"The utmost care is taken to protect the Company's employees and the public from avoidable accidents. A Safety Department in charge of experts, who are outside of the regular force of the Company, makes frequent inspections of all the operating departments, involving plants, holders, new construction, street openings, shops and office buildings; over 32,000 such inspections having been made during the year 1912. These inspections result in the installation of guard rails, safety appliances and other preventive measures designed to minimize the danger of accidents. The lease of the building, No. 29 East 21st street, which has for several years been used by the Fuel Appliance Department of the Consolidated Company for the exhibition of gas appliances and of a model kitchen and living rooms, will be given up February 1, 1913, and a larger amount of space, where such an exhibition can be made more attractive, has been secured in the new building at the corner of 42d street and Madison avenue, a much more desirable location. The urgent necessity for developing the utilization of gas for other than illuminating purposes is emphasized by the fact that the estimated consumption of gas, by the additional gas appliances installed each year, exceeds the actual growth in the annual sales, clearly indicating that, but for such increasing development, the total output of gas would diminish year by year. Old buildings, in which heretofore gas has been the only means of illumination, are being constantly demolished, to make room for new buildings equipped for the use of electricity, by which means the output of electric current is augmented at the expense of the gas business. In order to avail itself of every possible facility for increasing its output, the Company has organized a 'Department of Utilization,' and placed at its head an Engineer,[1] who is experienced not only in the technique of gas manufacture and distribution, but has specialized in the field of gas utilization. This Department will devote itself to the investigation of all appliances in the market, designed for the utilization of gas for domestic, commercial or industrial purposes, and all new appliances hereafter invented or offered for sale, as well as the study of existing appliances, with a view to their modification or alteration for the purpose of obtaining greater economy or efficiency in their use. It will canvass the subject of gas utilization, for the purpose of discovering possible new uses to which gas may be applied in lieu of other fuel, and will seek information regarding the activities in the field of gas utilization of other gas companies and manufacturers of gas appliances, both here and abroad. It will also endeavor to devise new and better methods of exploitation of gas as fuel and of popularizing its employment for this purpose. Other means availed of for increasing the output of gas are the display of appliances of all kinds in the branch offices and in the display rooms, rented for this purpose. The display of industrial appliances under the direction of specially trained experts in the Appliance Laboratory, corner 2d avenue and 22d street; the employment of 60 canvassers, whose efficiency the Company is endeavoring to improve through the medium of the educational course in "Gas Salesmanship," elsewhere referred to; the employment of 18 women demonstrators, who visit the homes of consumers and instruct them in the use of the various types of gas appliances, and newspaper and other methods of advertising.

1. Mr. Oscar H. Fogg.

During the year the Gas Companies installed 89,389 gas appliances, including 2,445 lineal feet of hotel gas ranges. During the year 1912 a 21-year agreement was made with the Third Avenue Railway Company, under which the New York Edison Company undertakes the operation of the Kingsbridge power house, and the supply of current, to meet the entire requirements of the Third Avenue Railway system. This service involves a station capacity of 30,000 kilowatts, or an annual consumption of over 100,000,000 kilowatt hours. During the year 1912 there were added to the generating stations of the New York Edison Company 56 automatic smokeless stokers, 20 superheaters, centrifugal boiler feed pumps and new feed water heaters; and the installation of three 20,000 kilowatt steam turbines was completed. There was also completed the reconstruction of overflow and suction tunnels, as well as the switchboard apparatus in Waterside Station No. 1, situated foot of East 39th street, Borough of Manhattan. Rotary converter capacity, to the extent of 20,000 kilowatts, together with 8,650 kilowatts in storage batteries, was added in sub-stations on the direct current system. On the alternating current system 4,000 kilowatts were added to the sub station transformers and 12,000 kilowatts in 16,000-volt 60-cycle transformers. The Edison Company cooperated in the organization of the "Electrical Show," held October 9th to 19th, 1912, in the new Grand Central Palace. This exhibition attracted a great deal of attention and seemed to be highly appreciated by the public, which attended in great numbers. In connection with the celebration, attendant upon the return of Cardinal Farley to this country, the Company undertook an outline illumination of St. Patrick's Cathedral, and, in spite of unusual difficulties and most inclement weather conditions, produced an example of artistic and spectacular effect which met general commendation.

There has been a continuation during the year of the hearings before the Public Service Commission in the matter of a complaint against the New York Edison Company's rates, filed by consumers at the instance of certain persons interested in the installation and operation of private plants. In the opinion of the officers of the Edison Company, the complainants have failed to make out a case against the Company worthy of serious consideration. During the hearings the Company submitted testimony showing that 36,783 of its customers contributed an average revenue per customer of only $1.28 per month, or $15.36 per year, and that 84,436 customers, or nearly 80 per cent. of the total number of customers of all classes registered on the books of the Company, contributed an average revenue per customer of only $5 per month.

Early in the year the United Electric Light and Power Company acquired by purchase a plot of land, including bulkheads, foundations and other improvements thereon, located on the Harlem River, at the junction of Sherman Creek and West 201st street (the dimensions being about 201.19 feet by 550 81 feet by 348.36 feet by 242.17 feet), and entered into contracts for the construction of a generating station, which was commenced July 12, 1912. At the close of the year the steel construction was about ¼ completed. Contracts for the building and equipment have so far been let to the extent of $2,982,619. The equipment thus far contracted for includes three 19,000 KVA turbo-generator units. An estimate, covering the completion of the building and equipment, to its ultimate capacity, indicates a total approximate cost for this generating station, complete, of $6,200,000. It is expected that the setting of boilers will begin February 1, 1913, that 8 boilers will be ready for piping by March 15th, and that the station will be ready to begin operations (with at least 2 of the 3 units) by the early fall of 1913.

The construction of the 187th street sub-station of the United Electric Light and Power Company, on property purchased by the Company, was begun early last summer. This building is now nearing completion, having been somewhat delayed by the general contractor. It probably will be finished and the installation of the permanent sub-station equipment begun within the next 30 days. Under an arrangement with the New York Edison Company, apparatus has been installed, and a part of the premises set apart, for the operation of equipment for the transformation of current, delivered under the agreement heretofore mentioned, from the Edison Company's Water-

(*Continued on page* 114.)

THE AMERICAN GAS LIGHT JOURNAL

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[Official Notice.]

"International Gas Congress, San Francisco, 1915."

Pacific Coast Gas Association,
Office of Secretary,
445 Sutter street, San Francisco.

To the Members, Pacific Coast Gas Association: Now, that the year 1913 is on its way, and at our convention which will be held in the "Garden City," San Jose, Cal., in September, our Association will have attained its majority (this being our 21st annual convention), it is incumbent upon us that we once more get our shoulders to the wheel with the end in view of making this convention one that will go down in our annals as a memorable one. Our Association, upon rounding into its 21st year, is confronted with what might be termed its first real responsibility. This statement can be made unequivocally, for the following reasons:

First.—We have pledged ourselves to the University of California, in an amount not less than $2,700 a year (which sum should be materially increased) for the purpose of establishing a Chair of Degree in Gas Engineering, and which sum is to be met by voluntary subscription on the part of the individual members of the Association for a period of 5 years.

It might be opportune to mention here, for the benefit of such of our members who have not already subscribed to the fund, that the subscriptions pledged up to this time range in sums from $5 per year to $100 per year, and if there should be any of our members who have not heretofore subscribed to the fund we take this means of soliciting their support at this time.

In connection with the work, President Wheeler, of the University, appointed a Committee, consisting of Prof. C. L. Cory, Prof. Robert Sibley and Mr. John A. Britton, and this Committee has recommended to the University of California that the subscription for the year 1913 be placed in the hands of the College of Mechanical and Electrical Engineering for its use in the following manner:

"The undersigned Committee, appointed by you to consider the proper utilization of the annual subscription by the Pacific Coast Gas Association of approximately $2,700, begs leave to report that, for the year 1913, the entire amount of said subscription be placed in the hands of the College of Mechanical and Electrical Engineering for its use in the following manner:

"A.—The construction in the Mining Building of a complete crude oil water gas set and all adjuncts, auxiliaries, and accessories.

"B.—The purchase of such necessary laboratory supplies and apparatus as may be deemed essential.

"C.—The purchase of books on gas manufacture and distribution as are not now in the library of the University of California.

"It is intended that the crude oil water gas set shall be of the laboratory type, sufficient in size to make all experiments for the determination of thermal efficiency of oil and the efficiency of all refractory materials, such as firebrick, entering into the construction of the generators.

"The laboratory apparatus to consist of such adjuncts to present installations in the University as may be deemed necessary, such as calorimeters and additions to bar photometry installations at present in use.

"It is expected that the Chemistry Department, through Prof. Lewis, will co-operate with the Engineering Department not only in such experiments as may be made during the year, but in such chemical analyses of gases and materials as would be proper under the course adopted by the faculty.

"It is expected that during the year co-operation of all the gas men on the Pacific Coast will be secured through the efforts of your Committee to aid instructors in the Engineering Department in the giving of lectures to the classes interested.

"It is further suggested that in the year 1914 a large proportion of the fund then to be delivered to the University should be used in the employment of competent instructors in the particular line of gas engineering."

The second responsibility which will devolve upon our Association is that of acting as host to the International Gas Congress to be held in San Francisco, 1915.

As you all know, Mr. E. C. Jones, as ex-officio member of our International Gas Congress Committee, was appointed as our special delegate to attend the annual convention of the American Gas Institute, with a view of inviting that body to hold its annual meeting of 1915 in San Francisco during the Exposition period, to participate in the International Gas Congress to be held at that time, and to take paternal charge of the International Gas Congress, and in its name issue invitations to the Gas Associations of the world. At the annual convention in Atlantic City (N. J., last October) it was regularly moved and unanimously voted that the Institute accept the invitation, and a working committee was appointed.

The National Commercial Gas Association, in convention at Atlanta, Ga., December, 1912, also voted to hold its annual meeting in San Francisco and participate in the International Gas Congress in 1915.

In this connection, Mr. Jones has obtained from the Panama-Pacific International Exposition Company invitations to 21 gas associations in United States and Canada to hold their 1915 convention in San Francisco and participate in the International Gas Congress.

The invitations have been forwarded to the American Gas Institute who, in turn, through their President, Mr. Addicks, will see that they are properly presented before the conventions to be held during the year 1913 by such Associations.

You will see from the above that our Association is intrusted with two matters of extreme importance to our industry as a whole; and, in order to bring both of these to a successful and happy conclusion, we must have the hearty co-operation of all of our members, for, as has already been said, upon our attaining our majority we at once find a man's job on our hands, and in order that this job may be accomplished with honor to our Association we will need the earnest support of every individual member of the Association.

In connection with our 21st convention, we will be glad to receive from any of our members any suggestions which they may have to make in so far as the subjects which should be taken up by us at this convention are concerned. We will need papers prepared, and while in the past we have found it necessary to seek out our talent and make special requests for contributions along these lines, we would like to establish a new precedent this year, if possible, in so far as having all papers to be presented before our coming convention volunteer contributions on the part of our members.

Our slogan from now on will be: "One for all and all for one, the International Gas Congress, 1915."

Yours for the Cause,
Henry Bostwick, Secretary.

P. S.—Our Volume IX. of the "Proceedings" will be forwarded to all members about February 1st.

[Official Notice.]

Forty-third Meeting, New England Association of Gas Engineers.

New England Association of Gas Engineers.
Office of the Secretary,
January 23, 1913.

The Forty-third Annual Meeting of the New England Association of Gas Engineers will be held at Youngs' Hotel, Boston, on Wednesday and Thursday, February 19th and 20th, 1913.

The meeting will be called promptly at 10 A.M., Wednesday. The programme for that day is:

Lecture on "Electrolysis," by Prof. A. F. Ganz, at 11 A.M.

Paper on "Accounting," by Mr. F. P. Royce, at 2:30 P.M.

"Notes on Chemistry of Gas Coal," by Mr. Edward F. Wilson, at 4 P.M.

Members will dine together Wednesday evening. Please bear in mind the importance of prompt attendance at the sessions.

Thursday.

Paper on "Coal Gas? Surely: But How?" by Mr. R. P. Brown, at 10 A.M.

Paper on "Gas Lighting," by Mr. R. F. Pierce, at 11:30 A.M.

Material for the "Question Box" should be sent in to the Secretary as early as possible.

Applications for membership should be in the Secretary's hands before February 18th.

All friends of the Association are cordially invited to attend the meeting.

N. W. Gifford, Secretary.

BRIEFLY TOLD.

Last week, in Chapter V. of the article on the Astoria plant of the New York Consolidated Gas Company, it is declared that the capacity of the relief holder, in connection with the water gas sets, amounts to 11,000,000 cubic feet. The error totals an excess of 10 millions cubic feet. That is all.

January Meeting, New England Section, National Commercial Gas Association.—Nearly 200 (to be precise, 185) members attended the last regular monthly meeting of the New England Section of the National Commercial Gas Association, which was held in Wesleyan Hall, Boston, Mass., the evening of the 27th ult. Mr. John McMillin, Sales' Manager of the Improved Appliance Company, New York, was the speaker of the evening, and the subject of "Industrial Appliances" was treated by him in an exceptionally able manner. The talk was plentifully and intelligently interspersed with pictures of

the various fuel appliances, which enabled him to explain in particular the construction of the appliance and the relation to each other of the several parts. He also gave some good, easily applicable advice respecting the proper manner of installing the devices. The lecture at an end, the members adjourned to the appliance rooms of the Boston Consolidated Gas Company, where a supplementary talk and a sequential demonstration were given by Mr. McMillin. The next meeting of the Section is down for the last of the month, at which session, Mr. T. R. Elcock, President, the Philadelphia Gas Works' Section of the N. C. G. A., will communicate a paper on "Advertising." As the author is a very widely and well-known gas man, Secretary C. J. Connell, to whom we are indebted for the meat in this recounting, and his associates confidently look forward to having (at least) as large an attendance as that recorded in connection with the current session. For the March meeting it is being arranged to have a joint session with the New England Section, Illuminating Engineering Society, the date respecting which will be published later.

FEBRUARY MEETING, PUBLIC SERVICE COMMERCIAL ASSOCIATION.—The regular monthly meeting of the Hudson Division, Public Service Commercial Association, was held in the Auditorium of the Jersey City (N. J.) Building, February 6th last, at 8 P.M. The attendance was large, and each district was well represented. The regular business order of the Association was dispensed with, in order that more time could be devoted to the educational and entertainment programme. Mr. G. E. Smith introduced as the lecturer for the evening, Mr. J. P. Conroy, of the General Gas Light Company, whose reputation as an expert authority on gas arc illumination is indisputable. Mr. Conroy, who is well know to gas men throughout the country, was well received, and his remarks, illustrated by lantern slides, of gas arc installations, were interesting as well as instructive. He told of the dint of hard work experienced in getting many of the gas companies to co-operate with his Company in pushing the sales of arc lamps throughout the country, and of the many companies whose indifference and disregard for the march of progress, made his task the more difficult, and how many of them refused absolutely to advocate the sales of the lamps. In concluding, he proved that perseverance and confidence in a meritorious appliance, could eventually win over, even the non-progressives, by showing photographs of large gas arc installations in actual existence in factories and auditoriums or on thoroughfares, etc. Refreshments and cigars were then served by waiters in comical costumes, and concluded with the rendering of several excellent cabaret numbers.

LAST MEETING, PHILA. GAS WORKS SECTION, N. C. G. A.—Advices from Mr. M. Gibbons-Neff, Chairman of the Advertising and Publicity Committee of the above-named Section, are to the effect that the regular monthly meeting of the Section was held in the Parkway Building, the evening of the 28th ult. The very interesting query, "Is the Reflex Light Better for House Illumination than the Upright Light," was thoroughly discussed by the members in general. A paper on the subject was prepared and read by Mr. C. J. Smith, representing the point of view of the sales' force, and during its consideration many profitable ideas were exchanged. Mr. J. B. Lawrence, of the Distribution Division, demonstrated by the use of charts a comparison of light curves, at various angles, of the reflex and upright lights, which proved very instructive. Mr. J. D. Lee, of the Illuminating Division, also expressed many helpful ideas on the subject. A special feature of the meeting was a most interesting address by Prof. Henry Ludlum, of the Ludlum School of Dramatic Art, whose subject was "The Value of Accurate and Effective Expression." His speech impressed the members of the Section with the necessity of talking accurately and convincingly, also noting the importance of proper and timely gesticulation. In the closing address, Mr. T. R. Elcock, President of the Section, recommended the formation of Debating Classes, to promote public speaking by the members at these meetings.

INDUSTRIAL ILLUMINATION.—The Home Secretary of Great Britain has appointed a Committee to inquire and report as to the conditions necessary for the suitable and adequate lighting (natural or artificial) of factories and workshops, having regard to the nature of the work carried on, the protection of the eyesight of the persons employed and the various forms of illumination. The Committee is thus composed: Dr. R. T. Gazebrook, C.B., F. R.S., Director Nat. Phys. Lab. (Chairman); Mr. Leon Gaster; Prof. Francis Gotch, D.Sc., F.R.S.: Mr. J. Herbert Parsons, M.B., D.Sc., F.R.C.S.; Mr. W. C. D. Whetham, F.R.S., and Sir Arthur Whitelegge, K.C.B., Chief Inspector of Factories. The Secretaries are: Mr. D. R. Wilson, of His Majesty's Inspection of Factories; and Mr. C. G. Paterson, M.I.M.E., A.M.I.C.E., of the National Physical Laboratory. Any communications regarding the inquiry, which will be exhaustive and far-reaching, should be addressed to Mr. D. R. Wilson, Home Secretary, London, England.

JANUARY MEETING, N. Y. SECTION OF THE "GAS MEETERS."—The evening of the 30th ult. was the date on which 60-odd members of The "Gas Meeters," New York Section, were seated in Kalil's, to pledge in enthusiastic speech and other form of expression, their heartiest support to advance a movement tending to technical improvement and the closer cultivation of good fellowship. Mr. Harry P. Dains, of the Philadelphia Section (No. 2), made a special trip from Philadelphia to represent the Quaker City on this occasion. Mr. Will W. Barnes presided, and Mr. Louis Stotz acted as Secretary, in the unavoidable absence of Secretary Owens. The speaker of the evening was that well-beloved gas man, Dr. Arthur H. Elliot, who spoke (like the master he is on these matters) forcefully and illuminatively on the topic of "Candle Power, Heat Units and Pressure." And not the least interesting chapter of his discourse was that wherein he dwelt upon the earlier days of the gas industry. The discussion brought out was vigorous and general, at least a good majority of those present joining therein. The Constitution as submitted was adopted without discussion. During the progress of the meeting the long distance telephone was brought into requisition to congratulate the New England Section (then in session in Boston) over its lustiness and to extend the right hand of fellowship with the thought that, given genuine co-operation, "The Gas Meeters" would be an active body for good in furthering the aims and purposes of the industry at large.

CURRENT MENTION—

"SOLICITOR," writing from Boston, Mass., under date of the 1st inst., says: Dear JOURNAL—Last Wednesday, Mr. Charles E. Blood, of the General Gas Light Company's New York division, spoke before the employees of the Boston Consolidated Gas Company, on how to successfully lease, rent or sell gas consuming devices to the general public. That he talked to the point seemed borne out from the round of applause that greeted his speech; and if further proof seems necessary in this respect, one has only to report that a rising vote of thanks was passed to him when the talk was ended.

THE Backus Heater Company has been formed in Brandon, Vt., for the purpose of manufacturing, supplying, buying, selling and generally dealing in gas stoves, heaters and the like. It is capitalized in $50,000, and the subscribers thereto are: F. E. Backus, T. W. Ray and F. W. Williams, of Brandon; H. J. Dodson, W. C. Clement and Gustave H. Grimm, of Rutland, Vt.

AT the special election held some days ago in Tecumseh, Mich., for the purpose of determining whether or not the proposal of Messrs. Cole & Strab, of Chelsea, to build a gas plant, should be accepted, was virtually unanimous; 429 votes were cast, of which 424 were in the affirmative.

PLANS for the rebuilding of the coal gas plant and the construction of a water gas set at La Crosse, Wis., as well, are now well underway, and contracts on such account will be awarded shortly. The daily output capacity of the completed works will be 650,000 cubic feet, or practically double the capacity of the existing coal gas plant.

"B. P. B.," writing from Pittsfield, Mass., under date of the 5th inst., tells us that the employees of the Pittsfield Coal Gas Company were tendered a dinner by the Company the evening of the 3d inst. The dinner was served in the main dining room of the American House, and Mr. H. C. Crafts, Superintendent of the Company, acted as Toastmaster, and the 52 present will testify to the truth of the statement that he was an excellent one. These addresses were made by the following named speakers: "Service," by President Wm. L. Adam; "Efficiency," by Mr. G. R. Nixon; "What Is a Gas Company," by Mr. H. A. Dunbar; "The Oldest Employee," by Mr. Jos. Volin; "As It Used to Be," by Mr. John F. Dunbar, former Superintendent of the Company; "Co-operation," by Mr. Herman Meyer; "An Employees' Club," by Mr. John Finn; "The Gas Business and Its Growth," by Mr. Daniel M. Cullen, Jr. Dinner over, after some general discussion, it was voted to form an Association of the Pittsfield Gas Company Employees, and Messrs. David M. Cullen, Jr., John Finn and Francis Connors were appointed a committee to prepare and submit on a date in the near future plans for the permanent organization."

AT the annual meeting of Messrs. Rathbone, Sard & Co., of Albany, N. Y., the Directorate was increased by the adding thereto of Mr. John J. Garrison and H. P. G. Nostrand, and Mr. R. E. Sard and the first named were also chosen First and Second Vice-Presidents, respectively.

THE Gas Machinery Company, of Cleveland, O., is furnishing silica retorts and settings for the generating houses of the gas plants in Austin, Tex.; La Salle, Ills.; and Waukesha, Wis. The installations at La Salle and Waukesha are to be duplicates of those formerly constructed there by the Gas Machinery Company.

AT a meeting of the State Medical Association of Eastern Oklahoma, held in Muskogee, Jan. 27th, a demonstration of the Muskogee Gas and Electric Company's method of using the pulmotor was given. The test was so surprising in its results that the Superintendent of Public Schools requested that a like demonstration should be made, in series. That is, first in the High School, and afterwards in each of the Ward Schools.

ANOTHER bit of information from the Byllesby Company's properties is to the effect that the largest seven-day output ever recorded in the gas plant at Everett, Wash., was that for the week ended Jan. 16, the figure being 16 per cent. in excess.

(*Continued from page* 111.)

side Station for the account of the Third Avenue Railroad Company. This sub-station will have an ultimate capacity of 15,000 kilowatts and, according to the Company's estimate, will meet the growing demand upon its system in the upper northwesterly section of the city, for the next 10 or 12 years. Provision will be made on the top floor for an adequate assembly room, which may be used for the benefit of the Company's employees.

"A new strictly fireproof, 7-story building, on the south side of West 147th street, erected on property purchased by the United Company during the year, is now completed and the Company is in possession of the premises. It will be devoted to the housing of the Company's transportation equipment, storeroom, meter shop, central station laboratory, general repair shop and construction forces and, according to the Company's estimate, will meet its requirements for these departments in this section of the city for the next 10 years.

The municipal street lamps on the lines of the Consolidated Gas Company and its affiliated gas and electric companies, December 31st, 1912, consisted of 24,758 incandescent gas lamps, 122 open flame lamps, 10,419 electric arc lamps and 11,431 electric incandescent lamps, a total of 46,730 street lamps. The total number of gas meters, in use at the end of 1912, was 875,017, and of electric meters 221,361. The combined sales of gas of the various companies during the year were 28,938,236,256 cubic feet, an increase over the previous year of 3.86 per cent. The sales of electric current during the year amounted to 407,966,066 kilowatt hours, an increase over the previous year of 22.37 per cent. The taxes, charged against the earnings of the Consolidated Gas Company and its affiliated gas and electric companies during the year, amounted to $3,533,529.73. There was expended during the year, for additions to and betterments of the producing and distributing plants of the various gas and electric companies, the sum of $12,547,962.92.

At a cost of $4,408,061.21 for repairs and $2,700,884.11 for renewals, or a total cost of $7,108,945.32, these properties have been maintained at the highest possible point of operating efficiency, thus insuring the best results as to the quality of the gas and electric service as well as to economy in the cost of the production and distribution of gas and electricity.

The Education of Employees.

[Prepared by Dr. Lee Galloway, for the Eighth Convention, National Commercial Gas Association.]

Can the strenuous business man, manager, superintendent, foreman or chief clerk even *pretend* to give the men below them systematic and personal supervision for purposes of general instruction in the duties of their departments, and in the broader bearing of their departmental activities upon the business as a whole?

If the men of superior positions and opportunities cannot instruct the men lower down, who then is to teach them? The majority of men in the minor business positions left school before they finished the grammar grades, and were thrown into a complex business life without a broad cultural background and without the power of close and continuous intellectual concentration. Will any gas company acknowledge that its business does not call for these qualities in employees? If I understand the position which our gas companies hold in the social system of to-day, there are duties and obligations to be met by them which are calling for the highest type of men to fill, not only the managerial and highly skilled mechanical positions, but the subordinate positions as well.

The gas company is not selling gas alone; it is selling gas *plus* service, and the manufacture of that service is just as complex as the making of the gas. A company which found one of its machines unable to meet the requirements put upon it would not hesitate to spend months, or years if need be, to perfect it. The company would realize that not only is there loss due to the small quantity of poorer quality of this single machine's output, but that the whole product is affected. No process made up of interdependent operations is stronger than its weakest machine.

The manufacture of service by a gas company is controlled by the same principle. The men in your complaint department may be all that we could ask for in intelligence, courtesy and tact; but one man in the distribution department may so nullify these good effects, by a lack of knowledge of the company's policy or through a lack of appreciation of the necessary co-operation, that the product (*i. e.*, service) is greatly depreciated. The distinguishing feature of our modern methods of manufacture is the division of the processes into many minute operations. But the finer the division into which these processes are separated, the greater the necessity of co-ordinating the production of each department with that of every other department. To do this work most efficiently, skilled mechanics are employed to study the machines, the methods and the product continually. It is only by this means that gas is kept up to the standard. If it is not stretching the imagination too far, it might be said that the machines and the material are continually improved and taught to do the work effectively. When skilled mechanical engineers are employed to do this work, little complaint is found. In fact, so general is the practice to-day, that no firm would consider itself well equipped if it did not have a trained staff of mechanical experts to study and improve the machine and co-ordinate the various operations. Yet this department had to fight its way against prejudice and ignorance. The foremen, the superintendents, the managers, all thought they knew more about machines than any expert mechanical engineer.

Now, if it is important that the equipment of a plant be studied and continually improved in order to obtain a high quality in its material product, how much more important is it that the *men* of the company be instructed and improved so that the *service product* may attain the highest standard of excellence. If the material goods of a gas company must be continually improved to meet an exacting consumer's demand, how much more improvement is necessary in the *service* of a company which must keep pace with a public demand not only recently awakened to new necessities but to its rights and privileges as well. Mechanical inventions advanced the gas industry in the making of a suitable material product. Education must equip the employees (the men) to turn out an efficient service product. The power of a machine comes from without and is supplied by invention. The power of man comes from within and must be developed by education. The conclusion is clear. If the service product of the gas companies is to reach and maintain as high a standard of excellence as its gas product, then the companies must educate the employees in its policy and organization.

The organization of a gas company is built up with two business policies prominently in view. One policy demands a careful consideration of the economic features of the location of plant and administrative buildings, of the arrangement of the offices, of the division of the duties between the various departments and of the selection of proper persons to perform the work. The deciding of these things may be called the determination of the internal policy of the company.

Another policy demands that the company must ever watch the points of contact between its activities as a business concern and the interest of the public it serves as a utility agent. These points of contact are found in a general way in a company's financial dealings, its franchises and legal proceedings, its manufacture and distribution of gas and its sale and service to the individual consumers.

Whatever may have been the attitude of the gas companies in the past, it is certain that no progressive company is ignoring the points of contact with the public to-day. A new emphasis is being put upon this policy, and the employee who recognizes its importance to the company will see in it, at the same time, his own opportunity. But the salesman or office man cannot jump at once from the narrower province into a full realization of the public utility features of a company's programme. He must, first, become a thorough student of the technique of the position he is filling. Then he must study thoroughly the organization of which he is a part. He will then be in a position to study the points of contact which his company has with the State, the city or town and the customer.

A Modern Application of an Ancient Bit of Philosophy.—In order to anticipate a question sure to arise in the minds of some, let us see in what way a knowledge of other departments than the one in which an employee works may increase his own efficiency and that of the company as well.

Did it ever occur to you how much energy and time are wasted through departmental rivalry and jealousy? Did you as an employee ever feel that your suggestions were lost and your efforts unappreciated by some other department; perhaps your own? Did you ever feel that the "boss" who came to his desk of a morning, read his paper, smoked a cigar, gave a few directions to his stenographer, and then rode away in his automobile to lunch was a sort of parasite? Did you ever give up a good idea because you knew that "company politics" would bar or hinder its acceptance? These are only samples of the familiar queries that might be put and the answers to them would show a lack of co-operation and the presence of enough friction

to counterbalance all the good that might come from the latest systems and methods of management. Ninety per cent. of the jealousies, of the apprehensions of being displaced in the favor of the boss by a rival, of the petty politics and criticisms of superior officers, would disappear if the employees of a company knew the character of the work performed by the other departments. Old Æsop had a word to say along this line that has not been better said since his time. It is very applicable to the present attempts of every big corporation to bring about a greater measure of departmental co-operation. It is as follows:

"One fine day it occurred to the Members of the Body that they were doing all the work and the Stomach was having all the food. So they held a meeting, and after a long discussion, decided to strike work until the Stomach consented to take its proper share of the work. So the Hands refused to take the food, the Mouth refused to receive it, and the Teeth had no work to do. But after a day or two the Members began to find that they themselves were not in a very active condition; the Hands could hardly move and the Mouth was parched and dry; while the Legs were unable to support the rest. So thus they found that even the Stomach in its quiet way was doing the necessary work. For the Stomach and all must work together or the Body will all go to pieces."

The boss who puts the pay in the envelope on Saturdays may be doing his best thinking between puffs, and the superintendent of a department may be digesting plans and directing policies of which the employee cannot of necessity know anything. But the employee not knowing the what, the where or why of anything in his organization becomes supicious of every movement and, like a near-sighted horse, shies at every shadow. To overcome this skittish attitude many companies have attempted to drive their employees with blinders. This method, however, in our present large organizations, where much responsibility must be put upon the employees, is no longer effective. It is better to show them the unsubstantial nature of shadows. No employee is in a position to see the big ideas which the company represents before the public until he knows what his own department stands for within his organization. When he understands the meaning of his company's organization he is ready to be educated in the company's public policies.

If the gas companies want their representatives to stand for the big idea of public service they must instruct their employees so that they may grasp that idea. The company must see to it that the community is not better informed than its representatives. It is quite possible that a company's advertising may be more conspicuously displayed before the public in general than before its employees. It is, therefore, also possible that the consumers may read and believe "the public be pleased" signs of public service corporations while the employees of the same company may remain in ignorance of either the sign or the methods necessary to carry out the policy.

A man is no bigger than the idea he can master. The idea of service is to the public service corporation what the force of gravity is to our planetary system. Those races or individuals who do not grasp the idea of the latter are always filled with suspicion and fear of the commonest natural phenomena. The employee who does not comprehend the meaning of public service is likely to be filled with similar emotions at the company's goodwill policies.

Both of these ideas are abstract, and it is not enough to state the law of gravity to the student of science or to repeat, day-in and day-out, to the employee the law of public service. He cannot grasp it until it is put into concrete form—until it is demonstrated; but, the question will be asked, "Is not everyday business a practical demonstration of the policy of the company?" It might just as well be said that the revolution of the planets about the sun and the falling of the rain are also continuous demonstrations of the law of gravity, yet how many men would associate the same influence with the control of the two phenomena? How many men would be capable of discovering the law of gravity if left to themselves? Newtons and Galileos are scarce. Likewise are the men scarce who first put the hyphen in "public-service."

The knowledge which was first the possession of a few scientists and business executives can be imparted by proper instruction to the humblest student of science or of business. A simple laboratory device will give the scientific student a clear comprehension of the law.

The rest of his education consists in following out its various applications. In business also the instruction in public service must be given so as to impart the principle by means of a concrete demonstration and to show the employee the law of the power of attraction through service.

The number of failures "to make good" in any large office emphasizes the necessity of providing some sort of training for the men who are expected to succeed and stay with the company. The few who have ultimately worked out their own salvation did it by obtaining this knowledge by the most difficult method, and they would have fallen by the way, but for their grit.

Many of these failures are due to incapacity, but more are the result of discouragement, which comes through the inability of the employees to see the meaning of the situation into which they are forced.

The manager employs a young man and puts him to work after a few brief words in explanation of what the company expects of him. From this the employee is expected to catch "the idea." To the employee this idea is an abstraction. He has no way of "seeing it." He knows nothing of the real meaning of "service." Yet the idea that he is to represent a great and powerful company fills him with enthusiasm. To the new recruit in business this idea has all the glamor, all the inspiring qualities, all the incentives to begin his work that the big selling campaign has for the new business manager, that the revolutionary theory has for the chemical expert in the production department, that the momentous and unperfected invention has for the mechanical expert. Such ideas have the power of taking possession of a man, and they will either hold him in their grasp or compel him to slink away from the task—the result depending upon his ability to embody these ideas into concrete realities.

How to make over the *idea* into a concrete reality is a problem which every manager should try to solve. As a rule, the idea which the sales manager impresses upon his men is to get out and get the business! He hands out a catalogue, outlines the boundary of the territory to be covered, salts the main idea with a few platitudes about perseverance, gift, tact, etc., peppers it further with a few personal experiences in proof of his own successes and sends them out flushed and boiling over with enthusiasm for the "big idea." To represent a great gas company, to go out and get business for it, is an inspiring thought, but it can seldom result otherwise than fatally to the sales manager who is unable to break up the big idea into reasonable "stints" for his salesmen to work upon. The majority of men keep staring at the whole problem, and the longer they gaze at the whole problem, the more worried they become at its magnitude, its difficulties, and its constant demands. Soon their enthusiasm is gone, then their courage—finally their interest and—their job. And this generally happens to the very men who are most worth keeping—the men who can grasp a big idea and become enthusiastic over it, the men who have championship ability, but who have not been brought up to form by training. The man with little ideas attacks his job in a small way, but he gets something done and out-of-the-way each day. He is not worried about the size of his territory or spirit of public service. A gas tip sold is his idea of "getting the business." He is generally enthusiastic, for he has solved in a crude manner the problem of breaking up his job into "stints." Each sale is a job finished. He has a specific accomplishment to his credit and he is thus encouraged to attack the new thing that's ahead.

If a gas company wants all of its salesmen or all of its employees to be of this calibre, perhaps the familiar practice of pushing an employee into a job and "giving him a chance to make good" should be continued. But what company is not constantly in need of men of a somewhat bigger calibre? What company has not looked over its selling force and then shaken its head when it needed a man for an executive or administrative position—a man who must understand the full meaning of the "big idea." How, then, may this kind of a man be induced to stay and train for promotion in the company? By introducing a systematic course of instruction for its employees the company breaks up the big idea into its various components and presents them one by one in a systematic and orderly development. As each step is finished, the employee gets the inspiration and enthusiasm necessary to attack the next point. In the meantime he is getting his practical experience in the field of business and the big idea is developing and fixing its hold upon him.

This is, of course, not simply a question of company policy, nor primarily one for pedagogical solution, yet both are important factors in shaping the attitude of the employee toward the work and determining the strength of his allegiance. In the first place, the company must be sincere in its efforts to expand the intelligence of the employee. A policy which uses its educational efforts simply for advertising purposes will gain suspicion rather than allegiance. The

American employee rightly resents any attempt to exploit his needs either for industrial betterment or for more education. No ulterior motive should inspire the company's educational plans, the development of the employee and the consequent gain to the company by being conducted by intelligence rather than by ignorance, and prejudice is the only true basis for establishing a company school. Education at this point serves a double purpose. It not only enables the company to carry out its public service policies with effect—a sufficient gain in itself—but it enables the company to gauge the ability and aptitude of its employees for the higher managerial positions. Nepotism has proven itself as ineffective in business as it has in the church and the State.

How Knowledge of Business Principles Helps the Salesman.—If the gas employee is ever to step over the boundary which separates the men of routine activities from the men of directive performance, he must saturate his mind with the larger ideas underlying not only the business which he represents, but business in general as well. He will soon discover that the fundamental principles upon which the gas business is built are at the foundation of every great commercial undertaking to-day. When the student of business has mastered these ideas and made them a part of his everyday thought he has prepared himself for advancement.

Such instruction has gone far toward making him a fit representative of a great industry. Every gas company desires its representatives to be able to meet with confidence and dignity the successful business men of the community. This is the employee's opportunity. The reason so many managers and other executives are chosen from the ranks of successful salesmen is that the salesman has opportunities of proving that he is not afraid of the men in his community who represent big ideas. It makes little difference whether these men are lawyers, doctors, clergymen, merchants or manufacturers. Their success depends largely upon their administrative ability in dealing with business matters. The salesman, therefore, who knows the fundamental principles pertaining to all businesses and thoroughly grasps their full significance has a ground of approach common to all classes of men. More than that, he is on a common level with the big men, for it is their ideas that make them big. The salesman who feels familiar with the principles of corporation finance, of accounting, of transportation, of speculation and investment, of money and banking, of business organization, etc., is in a very true sense familiar with the ideas of men who manage things. No salesman need be embarassed for the want of a suitable topic of conversational approach if he is filled with the facts and principles of business. In the office, in the shop, or in the market place, his mind is continually fed with suggestions all bearing directly upon his prospect's business interests.

It is astonishing how the mind grows upon what it feeds. The habit of marshaling details of business facts until they form themselves into easily grasped classifications soon shows itself in the ability of the office employee or the solicitor to handle more and more work with increasing ease and efficiency. It is a change of this kind which takes place in those men who, having been raised from positions of obscurity to positions of responsibility, are said to have succeeded in their undertakings. Their success is due to their having expanded sufficiently to meet the greater duties imposed on them. Expansion in this sense is simply the ability to adjust one's actions and decisions to a new environment both within the business itself and without. The successful manager has discovered the principles upon which his position stands and has traced them into all the other lines of related business activities.

It is not necessary, however, to wait for chance circumstances to force the salesman or office man to expand. Every Micawber who is waiting for something to turn up has that chance. There should be sufficient opportunity for every employee desirous of advancement to study the principles of business as they have been expounded by corporation heads and industrial managers. If the corporation would give the employee this chance, the educational opportunity for them would be quite complete, for while the employee is mastering the theory of business, he cannot complain of a lack of "laboratory practice." Is not each business day filled with experiments! What student of chemistry ever had such acid tests or quick reactions as the modern business man who takes his theories into his laboratory—the office, the factory, or the "street"—and puts them under the test of the formula, "Does it pay?" Any company which ignores for any length of time the legitimate claims of the employee capable of doing better things and taking bigger responsibilities does so at its peril. Officers of large corporations are finding it cheaper to put indigent and incompetent relatives on an allowance and to permit them to run high speed automobiles. Knowledge, like lightning, may strike hard, but it purifies the atmosphere.

(To be Continued.)

Petroleum in the Appalachian Fields.

The U. S. "Geological Survey Bulletin," No. 96, for the current month teams with interesting matter, presented in commonsense way, not the least noteworthy chapter being devoted to the matter named in the heading. It is stated that in New York the average decline in production of oil in 1912 was checked by the extensive cleaning out of old wells, stimulated by the rising price of the material, according to David T. Day, of the United States Geological Survey; but the yield in New York State is now so small that even the increase in price has not stimulated much drilling of new wells. Drilling of gas wells, however, was fairly active.

In Pennsylvania an unusually good well was drilled (June, 1911) by Potts Bros. & Fife on the Stewart Park lots, in Cannonsburg, on east edge of Washington county. Over 30 wells were drilled on town lots as rapidly as they could be put down, the best yielding about 600 barrels a day. By the spring of 1912, however, the pool had declined very much, in spite of efforts to extend the producing area farther to the north. In Allen county several wells, yielding as much as 25 barrels a day, were drilled in the neighborhood of Pine Creek and in the Perrysville pool. In Butler county the increased value of old oil wells due to the rise in price of oil was made evident by the purchase of 300 acres of land, including 24 producing wells, at a price that approximated $2.25 per barrel of production. This is the highest price which has been paid in this region in 20 years, and is evidence of the great "staying qualities" of these wells. Interest in the county was also stimulated by the striking of a 100-barrel well on the Dodds' farm, Penn township. Another 100-barrel well was obtained in the old Bristoria pool in Greene county.

Gushers Struck in West Virginia.—In West Virginia the remarkable development in the Blue Creek pool, Kanawha county, begun in September, 1911, aroused greater enthusiasm than any other development in recent years. The first well was drilled by the Ohio Fuel Oil Company, simply to protect a lease which was about to expire on the Bart-Schwartz land. A good gusher was obtained. Next the Edwards Oil Company struck a 720-barrel gusher on the farm of the Graham heirs. Gushers of much greater size followed quickly, drilled by the Ohio Fuel Oil Company, the Hamilton Company, and others. It is interesting to note that, in 1864, when drilling began at Burning Springs, in Wirt county, it extended up Elk Creek to the mouth of Blue Creek. A Mr. Goddard also leased the present Blue Creek region, but did not drill.

In 1912 the field extended rapidly to the northeast and the southwest, until it attained a length of about 10 miles. In May its highest production was reached, 25,000 barrels a day, but wells were drilled so close together that a decline was inevitable, and by June 17 the production was estimated at 20,000 barrels and 12 days later had declined to 16,000 barrels a day. In July much new production was added, but the old wells declined so rapidly as to offset the increase, and production settled down to 15,000 barrels, by the middle of August to 13,000, and a month later to 8,500. By the middle of October it had increased slightly to 10,000 barrels, and at the end of the year there was a steady production of 8,000 barrels. Meantime the excitement caused by this unusual development extended the drilling of the Falling Rock Creek pool and the Big Sandy district, both adjoining the Blue Creek pool. The former started with a 100-barrel well on September 21, and the interest still continued at the end of the year. The oil comes from the Berea grit. The Big Sandy region obtained a gusher of 2,000 barrels a day late in October, which quickly settled down to 200 barrels a day, coming also from the Berea grit. There is a prospect of considerable production from various extentions of the Blue Creek pool, especially in Clay county and Lincoln county. Roane county was second to Kanawha in the interest aroused during the year. A 50-barrel well was obtained early in February, 1912. Late in the year the Spencer district was developed in the Berea grit, and wells yielding from 100 to 450 barrels a day were very common. Prospecting was active in the old Shinnston district, in Harrison county, and on October 5th a 500-barrel well was obtained half a mile north of Shinnston. Before the end of the year sufficient oil was obtained to extend the old Shinnston pool half a mile to the north, with wells which held up satisfactorily. Other wells which

developed interesting prospects during the year in West Virginia are in Calhoun, Cabell, Boone, Gilmer, Ohio, Pleasants, Ritchie, Tyler and Wetzel counties.

Activity in Kentucky Field.—In Kentucky during the entire year unusual interest in oil operations was shown throughout the State. By persistent efforts in Lawrence county, many small wells were obtained in the Little Blaine Creek district, and the average initial production of only 10 barrels a well was increased by striking a number of wells of 25 barrels. In October the pool was yielding 100 barrels a day, the wells being good stayers. Pipe-line facilities were afforded during the year. The greatest interest in Kentucky came from the finding of a 200-barrel gusher, on July 3, in Ohio county. The oil is of good quality. The gusher was obtained at 1,800 feet. Several shallower wells (1,000 feet) have shown 10 to 15 barrels each. Late in October another well, good for 20 barrels, was put down, and in the same month two wells were obtained in Allen county at the same depth. This stimulated much prospecting in Muhlenburg, Hopkins, Webster and Logan counties, all in the western part of the State. In Morgan county, besides the prospect of piping gas to West Liberty, the finding of a well flowing 50 barrels of light green oil from a depth of 2,000 feet aroused interest. In August the old Wayne County field was extended into McCreary county by the striking of a 100-barrel well. The wells in the old Wolfe county field were obtained at slight depths and active preparations were made to extend the drilling to strike the Berea grit, in the hope of better developments at that depth. Meanwhile the old field was extended 4 miles to Stillwell Creek.

In Tennessee drilling was active in many parts of the State, especially in the neighborhood of Franklin, where, in addition to a considerable yield of natural gas, there is some prospect of obtaining oil.

Mr. Canning Williams on the Bookkeeping of Gas Undertakings.—The System in Use in Edinburgh.

Mr. A. Canning Williams, Treasurer to the Edinburgh and Leith Corporations' Gas Commissioners, recently read a paper before the Scottish Students Society of the Institute of Municipal Treasurers and Accountants, in the City Chambers, Edinburgh, on "The Accounts and Principal Books of a Gas Undertaking." Mr. James Dalrymple, General Manager of the Glasgow Corporation Tramways, President of the Institute, occupied the chair. Mr. Williams said that the Gasworks Clauses Act of 1847 set a limit on the profits to be made by gas companies and provided machinery to compel a gas company that was paying full dividends and whose reserve fund was at the maximum to reduce the price of gas, but, as a matter of fact, this machinery had not often been put into operation, as gas companies themselves usually had the good sense to reduce the price whenever circumstances warranted it. Section 38 of the Act laid down certain regulations with regard to the annual accounts. "The undertakers shall, in each year after they have begun to supply gas under the provisions of this or the special Act, cause an account in abstract to be prepared of the total receipts and expenditure of all rents or funds levied under the powers of this or the special Act for the year preceding, under the several distinct heads of receipt and expenditure." Although the words "under the several distinct heads of receipt and expenditure" were used, no indication was given in the Act as to what these heads should be. The Metropolis Gas Act 1860 was interesting because it gave the Home Secretary power to issue a form in which the accounts of the metropolitan gas companies should be kept. Section 35 of the Gasworks Clauses Act 1871 provided that "the undertakers shall fill up and forward to the local authority of every district within the limits of the special Act, on or before the 25th day of March in each year, an annual statement of accounts made up to the 31st day of December then next preceding, as near as may be in the form and containing the particulars specified in the schedule B to this Act annexed." The form given in the schedule (an enlargement and improvement of the Home Office form to which he had referred) was an excellent one. During the 40 years that had elapsed since it was drawn up, new methods of manufacture of gas had been introduced, and developments in regard to gas cookers, prepayment meters, etc., had taken place, thus making necessary some alterations in the mode of stating the accounts; but in essentials, and in spite of the latitude given in the words "as near as may be," the form had undergone very slight change. The uniformity in the presentation of gas companies' accounts permitted of comparisons being made (on the basis of per ton of coal carbonized and per thousand cubic feet of gas sold) between the working results of one gas undertaking and another, and this had fostered among gas engineers and others a spirit of emulation which had been of great advantage all round; in fact, the Act had had, in this respect, a beneficial effect that its framers probably did not comtemplate.

Local authorities owning gas works were not subject to the same provisions as regards accounts, etc., as were statutory gas companies. In place of the provision as to the limitation of profits, a clause was usually inserted in the Acts to the effect that an estimate of income and expenditure shall be taken out annually, and the price of gas fixed at such a rate as shall be sufficient approximately to balance the two. The establishment of a reserve fund was optional (there were always the rates to fall back upon in emergencies), but the creation of a sinking fund or funds for the redemption of capital was obligatory. Power, too, was also usually given to carry surplus profits to the district or other fund. In consequence of there being no statutory form for municipal gas accounts, considerable diversity of method in their presentation existed, although the larger municipalities, feeling doubtless that they could not well improve on Schedule B, published their gas works accounts on much the same lines.

In 1906, a Departmental Committee was appointed by the President of the Local Government Board to inquire into and report on the accounts of local authorities, and Schedule B of their report gave a "standard form of abstract of gas works accounts for publication by local authorities." It was an able adaptation of the other Schedule B to the requirements of local authorities owning gas works.

Dealing with the actual accountancy work of a gas undertaking, Mr. Williams explained the principal features of a set of municipal gas statements and accounts, by the aid of diagrams prepared, to his sketches, in the Commissioners' technical office. The expenditure journal was, he said, a very important book, as practically the whole expenditure of the undertaking was put through it. The book was made up periodically—monthly, quarterly, half-yearly or annually—and the totals of the various columns posted direct (or per the general journal, if preferred) to the respective accounts in the general ledger. In order that the journal might give a bird's-eye view of the whole of the expenditure, it was advisable to transfer to it the monthly totals of the wages analysis, salaries and petty payments books, the respective totals being, of course, allocated over the various analysis columns.

Recording Time and Wages.—Many different systems of recording workmen's time and wages were employed. The plan followed at the Commissioners' works had been described by their late Chief Engineer, Mr. W. R. Herring:

Immediately on passing the turnstiles, each workman is required to "ring on" at the time clock. This is done by means of a key (with a distinctive number embossed on it) inserted into a slot and slightly turned. By the aid of a clockwork device, the number of the key (which is the same number as that against the workman's name in the time and pay books), and the hour and the minute each man's key was inserted, are marked on a paper tape inside the clock recorder. The same procedure is followed when the men leave off duty.

The paper rolls, showing the time at which the men started or left off work, are removed by one of the three timekeepers (one on duty each shift), and the hour and minute recorded are entered in the time book and the rolls filed away for future reference. The foreman in each department also keep a book in which are entered the time of each of their men and the nature of the work he is engaged on during each day or part of a day, and these books are handed into the time office daily, and compared by the timekeepers with the entries already made in the time book.

The total time for the week, along with the rates of pay, is entered by the timekeepers into the wages book, which gives also a description of the work at which each man has been employed; an analysis of the amount due for each class of work is then made up and allocated into the various columns opposite his name.

All calculations, both as regards time and money, are checked by two independent parties, viz., the pay clerk and the superannuation clerk, whose duty it is also to pay the men every Friday during the daytime, and make up the wages for the men who leave off work at 10 P.M. and at 6 A.M. on the following morning, leaving the timekeeper, in the presence of the weigher, to hand out to the men the amounts already made up for payment. A further precaution is

taken before payments are made, by the foreman of each squad being present to certify to the identity of each individual when the wages are being paid.

Whatever method was adopted, it was important that the official who paid the wages should not be concerned in making up the time and wages books, and it was likewise advisable that the pay lists should be certified by the pay clerk and also by a works' officer. The weekly totals of the wages book were transferred to a wages summary book, whence they might be taken in monthly totals to the expenditure journal.

In regard to petty payments, it was advisable to supply the petty cashier with a round sum to meet small payments, the repayment of consumers' deposits, etc., the original amount advanced being made up monthly by the drawing of a check for the sum disbursed. This permitted of the banking, each day, of the total sum received the previous day, and was a better plan than making these payments out of current receipts.

The Gas Ledgers and Other Books.—In small undertakings, one gas ledger for ordinary consumers was enough, but in larger concerns two or more were required. In Edinburgh they had thirty, each containing the accounts of some 3,000 consumers. Except in special cases, three accounts were rendered per annum—for the spring, the summer and autumn, and the winter terms, respectively. The books were so arranged that one list of names and addresses sufficed for the three accounts. The meter states were entered up from the meter readers' books (or cards, which were being increasingly used for this purpose), and in order to effectively check the "consumption of gas" column, were summed, the difference between the totals of the "previous states" and the "present states" being equal to the aggregate of the "consumption of gas" column. In fact, each section was arranged on the self-checking principle, both as regards consumption and cash. No column was provided for dates of payments. Experience went to prove that they were very seldom required; hence to insert them would involve a great waste of time. If a date should be wanted, a reference to the folio in the collection book would give the information.

The prepayment gas ledgers were designed on lines somewhat similar to the ordinary gas ledgers; but as the slot meter system was a cash one, there was no need for names and addresses, the collection book numbers being quite sufficient. In some gas offices prepayment gas ledgers were not employed at all, the collection books answering the double purpose.

The residuals day book was designed on the tabular system. The book was made up and the invoices rendered monthly, and at the end of each term the unpaid debits were transferred to the residuals ledger. As it was necessary to arrive at the total weight and value of residuals sold during the quarter, half-year or other period, the daily and monthly totals of the cash sales book and the day book, respectively, were summarized.

The collection books, etc., were written up daily from the duplicates of the general receipt books, deposit receipt books, etc. Cash sales of residuals and fittings, and prepayment collections were entered in daily totals. After the payments had been posted to the credit of the payers in various ledgers and day books, and the amounts extended under their respective headings, the columns were added and proved, and the totals transferred to a collection summary book. Names were not given in the collection book, the account numbers being all that was necessary for posting purposes.

In gas offices where several gas ledgers were employed, the collection books should be provided with a column for each ledger, as this arrangement materially assisted the localization of errors at balancing time. In Edinburgh, with 30 gas ledgers in use, they found it necessary, in order to permit of the rapid posting of payments, that accounts paid at the office should be entered on loose sheets, which could be distributed among the posting clerks. They entered items paid to the collectors in books, because the accounts they received did not cover so wide an area as those paid at the office. As it would make an unwieldly sheet to provide a column for each of the thirty ledgers, they gave one column to each three ledgers, the items being afterwards further analyzed.

The time-saving system of posting direct to the general ledger from the subsidiary books greatly reduced the number of entries in the general journal. This book was useful, however, as a posting medium for such items as "depreciation," "interest accrued and unpaid," and for the closing entries at the end of the period covered by the published accounts. Some accountants dispensed entirely with the journal. He was not quite persuaded that this was wise, but he certainly thought the journal should be used as sparingly as possible.

Items of Interest
FROM VARIOUS LOCALITIES.

THE annual meeting of the Dayton (O.) Gas Company, which will be held this day week, should prove a very harmonious session, in that the annual reports will show that in the twelvemonth the sendout has increased over the previous year well over 17 per cent. During the year a dividend of 5 per cent. was declared on the prefrered stock, and the holders of common stock received a return of 4 per cent. There is little doubt that the acting executives will be re-elected.

IMPORTANT changes have been made in the personnel of the management of the Nashville (Tenn.) Gas and Heating Company. Mr. J. F. Stacey, who has been General Manager of the Company, has been elected its Vice-President, and will hereafter be the direct representative of the President, C. H. Geist, of Philadelphia. Mr. F. J. Blake, formerly Assistant Superintendent, and for the past year Superintendent of the Nashville works, resigned that berth, to accept a responsible post on the engineering force of the Stacey Manufacturing Company, of Cincinnati, which city will hereafter be his headquarters. His successor as Superintendent of Works, Nashville, is said to be a Mr. Feifer, Syracuse, N. Y., and Mr. Stacey's successor as General Manager is Mr. R. B. Coombs, of Philadelphia.

THE Directors of the Baltimore (Md.) Gas Appliance and Manufacturing Company have declared a semi-annual dividend of 3 per cent. on the preferred stock, for the half year ended December 30, 1912. This would indicate decidedly good business management, and further indicates that Baltimore as a business center is receptive to the maintaining of industries theretofore new to its custom.

IN further connection with Baltimore gas matters, we may note that Mr. J. E. Aldred, President of the Consolidated Gas, Electric Light and Power Company, sailed from New York the 8th inst., for Europe, where he goes to make final arrangements respecting the sale of its debenture stock abroad. He will return early in April.

A CORRESPONDENT in Detroit forwards (under date of the 10th inst.) this mention: "The United Light and Railway Company, of Grand Rapids, Mich., officially announces the purchase of the gas, electric, street railway and steam heating properties of the Peoples Gas and Electric Company, of Mason City, Ia.; also, the purchase of the Mason City and Clear Lake interurban property. The named properties are bonded in $822,000 and stocked in $1,036,000. The earnings in 1912 were (net) $51,000 above the purchase price. The United Light and Railways Company also made a contract to operate (with option to buy at the expiration of 4 years) the properties of the Iowa and Illinois Electric Railway, from Davenport to Clinton, Ia., which operates 40 miles of track. Negotiations now underway (and practically closed) look to the acquirement by purchase of the Iowa City Gas and Electric Company. These negotiations were conducted by President Frank T. Hulswit and Engineer Barrett, than whom no fairer minded men, or straight type of financiers, may be found in this or any other country."

THE New Haven (Conn.) Gas Light Company has petitioned the Connecticut Legislature for consent to increase its capitalization from $5,000,0000 to $10,000,000. This does not mean an immediate issue of shares, but is in consonance with the general policy of Mr. Nettleton and his associates to in times of peace prepare for the continuance of plenty.

"THE first annual ball of the employees of the Providence (R. I.) Gas Company was held in Temperance Hall some evenings ago, and you may take it from me that it was an unqualified success. Over 300 persons shared in its pleasures, and the programme listing 24 numbers was gone through without a break. Floor Director John Johnson and his associates, James Dunn and John Shea, deserve credit for the evenness with which the order was carried on, and John Devlin and his aides were certainly up to the duties that go with the acts of a reception committee.—B. Mc"

On the 6th inst., President George T. Bishop, George A. Craig, Treasurer, and other officials of the Washington, Baltimore and Annapolis Railway Company, formally took over the stock of the Annapolis Gas and Electric Company, which was acquired by the Annapolis Utility Company, which in turn is controlled by the Bishop syndicate. The trade involved perhaps $100,000, irrespective of assuming certain bonded indebtedness amounting to $190,000. The purchasers propose to change the source of power to the Potomac Electric Power Company, of Washington, which is now furnishing power to the Washington, Baltimore and Annapolis Corporation. Heretofore the Annapolis Company manufactured power on its own account.

The Superintendent of Public Lighting, Baltimore, Md., asserts that, prior to the making of the contracts on public lighting account in that city (some time next month), he will demand that the Consolidated Gas, Electric Light and Power Company be obliged to pay the cost of making the necessary connections between the mains and the street lamps. Such a proposition is altogether unlike the sort that are usually framed by Superintendent McCuen. If this were good law and sound practice, then every consumer of the Company could legally demand that the Company do for them that which it was doing for the city.

At the annual meeting of the Washington (D. C.) Gas Light Company these Directors were elected: Joseph Leiter, H. S. Reside, Jno. D. McIlhenny, Ord Preston, James M. Green, Guy F. Whiting and Daniel Fraser. According to the annual reports the income from gas sales amounted to $2,088,120.62; coke, tar, ammoniacal liquor, netted, $43,019.29; steam, and other sources of revenue yielded $23,408.32; or a total of $2,162,959.22. The expenses are set down as $1,552,202.44, which includes taxes, accounts written off; fixed charges, insurance, etc. The main charges or items to works' account included these: Coal, $229,152; oil, $332,446.67; labor, $85,599.15; purifying material, $4,592; water, $2,065.96; transmission and distributing expenses, $166,848.91; taxes, $165,377.88; interest, $186,024.04; salaries, $81,689.83. It is a queer anomaly that is here shown in the relation of "salaries" to "labor wages:" The former is $81,689.83 the latter is $85,599.15. All that the "pension and relief" divisions cost the Company was $3,301.64.

The Terry Steam Turbine Company, from its Hartford (Conn.) offices, under date of the 7th inst., announces the transfer to there from New York of Mr. Norman L. Snow, who will act in the capacity of General Sales Manager. The New York city offices (90 Wall street) will as heretofore continue under the management of Mr. Frederick D. Herbert.

A man with the suggestive name of Gabler (it just lacks a "b" to make it still more real that fanciful), is voicing his belief, at meetings of the local Civic Association and elsewhere, that Douglaston needs gas and must have gas. As Douglaston is in the district of the New York and Queen Gas Company naturally the people (including Gabler) looks to Mr. Maynard's corporation for such supply, but Mr. Spear's people have, very sensibly been trying to determine what the eventual cost to their corporation would be. That is, what it would cost to lay on the supply, the likely number of takers and their likely monthly use of gas; and the investigation was being made in the season when main laying was not a possibility. Gabler was told these things, but as Douglaston needed gas, and as Douglaston's needs should be attended to forthwith, he asserted that Mr. George McDonald, of the Public Service Corporation, of Long Island, whose right to supply gas to the denizens of the nearby settlement of Little Neck, should be appeal to, even if the carrying out of the plan involved 'Mc.'s" of invading without shadow of right the light of Douglaston. However, Mr. Gabler may keep on gabbling just to amuse himself, or to keep his tongue active, and in the gentle spring time when the geese are honking up Long Island Sound, on their way from the Sunny South to the North's haven of cool lakes, then Mr. Maynard's men will (possibly led by the Sullivan Brothers) with pick and bar and skids pipe the fair settlement of Douglaston as it never was piped before.

The annual meeting of the Employees' Association of the Lynn (Mass.) Gas and Electric Company was held in the Sagamore Building, Lynn, the night of the 4th inst. Routine proceedings showed that the Club had prospered well during the year, that its finances were in excellent condition, and that the interest in its proceedings was well sustained. The officers elected were: President, C. F. Adams; Vice-President, J. F. Dubois; Treasurer, R. E. Roberts; Clerk, D. J. Herlihy.

The following power schedule of charges is the revised one recently put in force by the New Bedford (Mass.) Gas and Edison Light Company:

Horse Power.	Cents per Kw. H.
1 to 3	5
3 to 7	4
7 to 12	3½
12 to 25	3
25 to 50	2½
50 to 100	2
100 to 200	1.9
200 to 300	1.8
300 to 400	1.7
400 to 500	1.6

A discount of 5 per cent is allowed on all accounts settled prior to the 10th of month, and a minimum charge of $1.50 per month rules. The horse power upon which the price is based is figured on the amount of current actually used during the month, averaged over the number of working hours in the month, on the basis of a 9-hour day. The Company thus works out this rate of charging: A meter records the use of 702 kw. hours during the month, made up of 9 hours each, or an average of 3 kw. per hour for 234 hours. Since a kilowatt equals 1½-horse power this is equivalent to an average of 4-horse power per hour, and the charge would be 4 cents per kw. hour, or $28.08 for the month's use.

All of the residents of Gloucester county, N. J., are banding together, the rallying cry being "dollar gas." The chief bugler in the convoking seems to be C. Fowler Cline (wonder if his initial letter would be a starter for "Cassie"), Mayor of Wenonah; yes, sir; egad sir, Mayor of Wenonah, who presided over "a gathering" of citizen-freeholders, fore-gathered to consider ways and means to cause the Public Utility Commission of the State to forthwith order a reduction in the selling rate to $1 per 1,000 cubic feet. During the initial tryst, C. Fowler emitted several honks respecting the avariciousness of the New Jersey Gas Company, as shown in its excessive rate schedule, accompanied other squawkings of a general nature. The matter, however, was allowed, per resolution, to remain in abeyance, until taken up for consideration at a session that was to have been held (again in Wenonah) last Saturday. We wonder how all this honking and squawking affects the New Jersey Gas Company's shareholders, who are patiently waiting some dividend return on the money paid in by them to erect works, and the like, many moons ago.

The annual report of the Laclede Gas Light Company, of St. Louis, Mo., for the twelvemonth ended December 31st, 1912, shows gross earnings of $4,444,498—an increase of $102,461 over 1911; the percentage earnings in the gross stand for 2.4. After allowing $266,217 for depreciation, and virtually $1,000,000 for the new building at 11th and Olive streets, and the equipment thereof, the net earnings were $2,039,179—an increase of $73,661; the percentage earnings in the gross were 3.7 as against the returns for the corresponding year, 1911. Over five thousand millions cubic feet of gas were sent out during the year—an increase of 5.7 per cent.; the electric output increase was 14 per cent. over the like return for 1911.

A life-size bronze statue of the late General Andrew Hickenlooper, ex-President of the Cincinnati Gas Light and Coke Company, ex-President of the American Gas Light Association, and ex-President of the Ohio Gas Light Association, has been erected to his memory in the National Park at Vicksburg, Miss., commemorating his great services to the cause of the Union in the late War of the Rebellion. The General was in active command of the engineering corps of General Grant's forces when the latter were besieging Vicksburg, and which was terminated by General Pemberton's surrender, July 4, 1863. The monument is a striking one, and it is asserted that no features of any others of our illustrious dead show greater relativity to actuality than do those of the hero, whose mercantile genius glowed as brightly as did those which brought him glorious renown on the battlefield. The monument, which will be publicly unveiled next spring, was privately viewed by the General's widow, 3 daughters and 2 sons, on the 1st inst.

The Market for Gas Securities.

Consolidated gas came in this morning at the lowest figures recorded in it for some time —bid, 134½; asked, 134¾. Of course, this is ex-dividend of 1½ per cent.; but even with that correction its weakness is marked. To be sure the wretched condition of affairs that prevails within the bounds of Mexico is largely accountable for the break, in that all classes of securities suffer from the disturbance; but we really fail to see wherein this miserable Mexican muddle can possibly affect gas share values in America—El Paso, Tex., alone excepted. Mexico has nothing to offer American gas makers, unless it be that later on we may get good gas enriching oils from there; but even then the price thereof, owing to location, transportation, etc., would cause these to be of little benefit to the gas makers this side of St. Louis. However, gas shareholders just now are more concerned over the S. O. Company's actual need, as a safe commercial step, to advance in stiff manner, the rate for oils in the United States, particularly the districts east of Omaha. Putting these things together it would look that further concessions in gas rates may not be expected. On the other hand, the facility with which the change may be made from water gas to coal gas manufacture, having in view a heat unit basis instead of a candle power value, should easily reassure gas shareholders that the fly in the ointment is but a shadowgraph.

The out-of-town situation corresponds with the one in town. All gas shares are lower. Perhaps the one holding best is our near neighbor, the Brooklyn Union Company, which may usually be counted on to prove the exception, whether the scale value goes up or down.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.
115 BROADWAY, NEW YORK CITY.

FEBRUARY 17.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	199,816,500	100	134½	134¾
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	3,500,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	106	106
Mutual Gas Co.	3,500,000	100	172	177
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	61
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	99½	101
Standard	5,000,000	100	69	70
Preferred	5,000,000	100	93	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	135	140
1st Con. 5's, due 1948, M. & N.	15,000,000	—	105½	107
Yonkers	200,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	½	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	600,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106½
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	133
" Bonds, 5's	10,500,000	—	104	106
Indianapolis	2,000,000	—	38	45
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	80	—
" 1st Mtg. 5's	200,000	1,000	91	
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	103	103½
Preferred	2,500,000	100	99	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	120
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	91	92
Preferred	25,000,000	100	94½	94⅝
Montreal L. H.& P., Canada	9,000,000	100	235½	236
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	110¼	111
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
Pacific Gas and Electric Co.	15,500,000	—	61	62
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	427½	430
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, Richmond, Va., October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N, Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, I. W. Peffly, New York; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, Will W. Barnes; Secretary, A. M. Berg, Sip ave., Jersey City, N. J. Philadelphia Section; Chairman, L. R. Dutton; Secretary, H. F. Patterson, Jr., 833 Chestnut street. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, F. M. Roberts, Haverhill; Sec., F. K. Wells, 69 Broad street, Boston.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 19th and 20th, 1913. Chicago, Ills. Officers: President, H. O. Channon, Quincy, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting,———— September, 1913. Meetings of Sections, monthly. Pres., Preston S. Millar; General Secretary, J. D. Israel, 29 W. 19th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March 12 and 13, 1913. Indianapolis. Officers: President, Howard L. Olds, Indianapolis; Vice-President, Wm. Wallace, Lafayette; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, May 22, 23, 24, 1913; Burlington, Ia. Officers: President, C. W. Fair, Atlantic, Ia.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association—Annual meeting, September——1913; ———— Officers: President, W. S. Blauvelt, Detroit, Mic; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May 20-22, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 19th and 20th, 1913 Boston. Officers: President, D. D Barnum, Worcester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting, April —, 1913, ———— N. J.— President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ————, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1913. President, F. W. Caldwell, Shawnee, Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18, 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry B stwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April 9-11, 1913; Officers, President, H. H. Ganser, Norristown, Pa.; Secretary-Treasurer. W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Charlotte, N. C., April 18-20, 1913, Officers: President, C. E. White, Montgomery, Ala.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May 21, 22, 23 and 24, 1913, Galveston, Tex. Officers: President, F. M. Lege, Jr., Galveston, Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 14 and 15, 1913, Milwaukee, Wis. Officers: President, I. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.